IBM® DB2 Universal Database™

Quick Beginnings for DB2 Data Links Manager

Version 8.2

GC09-4829-01

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Contents

About this book

This book will guide you through the planning, installation, and configuration of DB2 Data Links Manager on Windows NT, Windows 2000, AIX, and the Solaris Operating Environment.

Related documentation

Once your DB2 Data Links Manager is installed and configured, you will validate the installation through a test scenario.

After you have installed, validated, and tested your Data Links Manager setup, you should refer to the *DB2 Data Links Manager Administration Guide and Reference*.

For more information on how to define a DATALINK type column using the CREATE TABLE command, see the *DB2 SQL Reference*.

For information on DB2 Data Links replication, see the *DB2 Data Links Manager Administration Guide and Reference* and the *DB2 Replication Guide and Reference*.

For more Data Links Manager information, including redbooks and whitepapers, see the http://www.ibm.com/software/data/db2/datalinks/ website.

Who should read this book

This book is intended for anyone who needs to install and configure DB2 Data Links Manager for Windows NT, Windows 2000, AIX, or Solaris Operating Environment. You do not need any previous experience with DB2 Data Links Manager to complete the procedures described in this book.

Conventions

This book uses these highlighting conventions:

- **Boldface** indicates commands or graphical user interface (GUI) controls such as names of fields, folders, icons, or menu choices.
- *Italics* indicate variables that you should replace with your own value. They are also used to indicate book titles and to emphasize words.
- `Monospace` indicates file names, directory paths, commands, and examples of text you enter exactly as shown.

The term Windows refers to Windows NT or Windows 2000.

Chapter 1. Introduction to DB2 Data Links Manager

What's new in DB2 Data Links Manager Version 8

Enhancements delivered in Version 8.2:

- Data Links Manager online help and error message functionality

  This release enhances existing and adds new online help functions for the Data Links File Manager (DLFM) component of Data Links Manager: The **db2 ? message** command can now be used with DLFM error message numbers to get online help about DLFM error messages. The **DLFM ?** command can now produce online command help in multiple languages.

  Additionally, all DLFM error messages are now available in multiple languages.

Enhancements delivered in Version 8.1 (including all FixPaks and modification levels):

- The new *DB2 Data Links Manager Administration Guide and Reference* is a reference for system administrators, database administrators, and application programmers. Its contents include:
  - Link and unlink files
  - Update linked files
  - Replicate linked files with DB2 DataPropagator
  - Administer and secure both data and access on a Data Links server
  - Recover a Data Links server
  - Tune your Data Links Manager configuration
  - Troubleshoot Data Links Manager
  - Integrate various file systems to work with Data Links Manager
- DB2 Data Links Manager supports AIX® 5L Version 5.2
- DB2 Data Links Manager is available on the Windows 2000 operating system, in addition to Windows NT, AIX, and the Solaris Operating Environment.
- DB2 Data Links Manager supports both the Version 8 and Version 7 Solaris Operating Environments.
- You can update files while they remain under the control of DB2 Data Links Manager. "Linked files" are files under the control of the Data Links Manager. Before DB2 Version 8, you had to unlink a file, make changes to the file, then relink the file.
- Performance improvements have been made for archive, data recovery, and replication operations on linked files. These improvements:
  - Reduce the time for beginning backups involving linked files
  - Reduce the time for running the Reconcile utility
  - Improve the throughput on replication of linked files using DB2 DataPropagator
- Improved security features for restricting the linking of files to authorized users.

Withdrawal of DCE-DFS support in Data Links Manager Version 8

Data Links Manager functionality will *not* be provided for the DCE-DFS environment in Version 8. Data Links Manager continues to provide support for DFS™ in Version 7. Although you might find references to the DFS environment for Data Links Manager in the V8 product, install package, messages, and documentation, these should be ignored, as they are no longer applicable.

If you are a Data Links Version 7 user who is dependent upon the DCE-DFS support, you must either use a different storage environment with Data Links Manager Version 8, or you should not move to Data Links Manager Version 8 until you resolved your dependency on DFS.

Related concepts:

• "DB2 Data Links Manager" on page 2

Related reference:

• "What's new in DB2 Data Links Manager Version 8" on page 1

DB2 Data Links Manager

Working with DB2®, Data Links Manager provides four key elements of external data control:

- Referential integrity
- Access control
- Recovery capabilities
- Transaction consistency

Data Links Manager allows you to take advantage of the data storage features of both a Relational Database Management System (RDBMS) and a file system. You can continue to store unstructured data, such as images, engineering drawings, and x-rays, in a file system and also use an RDBMS to manage data stored within a database.

Data Links Manager offers a unique opportunity for e-commerce and internet applications, which are based on a file system paradigm, to be managed along with RDBMS data from a single point of administration. Other benefits of Data Links Manager include:

- Minimal or no changes to existing applications
- Maximize application performance and reduced network traffic by strategically putting external files close to applications
- Direct access to linked files through native filesystem APIs
- Works with UNIX® and Windows® file systems and takes advantage of the inherent benefits of the file system

Data Links Manager product extends the relational DBMS capabilities of referential integrity, value-based security, transactional consistency and coordinated backup and recovery to files that exist outside of your database. Data Links Manager manages these files as though they are logically within the database by extending database functionality to external file systems.

Data Links Manager simplifies and reduces system administration costs and complexities by providing a single administration point for file and database data. Data Links Manager guarantees:

- Referential integrity to external files
- RDBMS data value based access control to external files as an option
- Automatic and coordinated backup-and-restore capability within transactional environments

Related concepts:

- "DB2 Data Links environment" on page 3

Related tasks:

- "Installing DB2 Data Links manually using the db2_install command (AIX)" on page 43
- "Installing DB2 Data Links Manager using the DB2 Setup wizard (AIX)" on page 44
- "Installing DB2 Data Links Manager using the DB2 Setup wizard (Solaris Operating Environment)" on page 71
- "Installing DB2 Data Links Manager (Windows)" on page 20
- "Installing DB2 Data Links Manager manually using the db2_install command (Solaris Operating Environment)" on page 72

DB2 Data Links environment

A DB2® Data Links environment is composed of:

- A Data Links server, running DB2 Data Links Manager
- A DB2 Universal Database™ server
- A DB2 client
- (Optional) File archive server — Tivoli® Storage Manager or any product supporting the XBSA standard interface.

You can install DB2 Data Links Manager on:

- AIX® systems to manage files stored in a Journaled File System (JFS).
- Solaris™ Operating Environments to manage files stored in a UNIX® File System (UFS).
- Windows® NT or Windows 2000 systems with an NTFS-formatted drive.
- Tivoli Space Manager managed file system on AIX.

Related concepts:

- "DB2 Data Links Manager typical setups" on page 11
- "Data Links server components" on page 4
- "DB2 clients in the Data Links Manager environment" on page 5
- "DB2 servers in the Data Links Manager environment" on page 5

Data Links server components

A Data Links server has the following components:

- Data Links File Manager (DLFM)
- Data Links Filesystem Filter (DLFF) controlling a Data Links File System (DLFS)
- DB2® (Logging Manager)

Data Links File Manager (DLFM)

The DLFM tracks all the files on a Data Links server that are linked to one or more DB2 databases. The DLFM receives and processes *link-file* and *unlink-file* messages arising from SQL INSERT, UPDATE, and DELETE statements that reference a DATALINK column. For each linked file, the DLFM logically tracks the database instance, the fully qualified table name, and the column name referred to in the SQL statement in which the file is referenced.

The DLFM also tracks previously linked files, if they were linked to a DATALINK column for which the *RECOVERY YES* option was specified. This option allows DB2 to provide point-in-time roll-forward recovery for any file that is specified by a DATALINK column.

Data Links Filesystem Filter (DLFF)

The DLFF filters operations to ensure that linked files are not deleted or renamed, and that the file's attributes are not changed. Optionally, it also filters commands to ensure that proper access authority exists for READ PERMISSION DB and WRITE PERMISSION ADMIN files. AIX® and Solaris™ operating environment file systems under the control of a DLFF can be NFS exported. Windows® NT and Windows 2000 file systems under DLFF control can be net shared.

A file system under the control of DLFF is called a DLFS file system.

Data Links File System (DLFS)

DLFS file systems include FSM (File System Migrator; the filter file system component of Tivoli® Space Manager), JFS, NTFS, or UFS environments.

DB2 (Logging Manager)

A DB2 database, called `DLFM_DB`, acts as a logging manager for the Data Links server. This database contains registration information about databases that can connect to a Data Links server. It also contains information about the mount points of the file systems on AIX or Solaris operating environment, or the share name of the drives on Windows NT® or Windows 2000, that are managed by a DLFF.

Note: It is recommended that you **do not** interact directly with the DLFM_DB database (for example, connecting to it directly, and either querying or *especially* updating any information) except to take backups and perform restore and rollforward operations as necessary for recovery purposes, or to set certain database configuration parameters to ensure adequate space for logging, and so on.

The contents of this database are not documented, and this product is not supported if the user has performed undocumented actions against the DLFM_DB, since the contents of this database are considered a product internal.

The DLFM_DB database also contains information about files that have been linked, unlinked, or backed up on a Data Links server. The DB2 Data Links Manager installation program creates this database during the installation.

DB2 can provide point-in-time rollforward recovery on the Data Links server for any linked file that is specified by a DATALINK column with *RECOVERY YES*. You can backup these files on disk, using Tivoli Storage Manager, or using an XBSA-conformant backup and archive utility.

The database backup makes sure that all the files on the file server that are linked to this database using a DATALINK column are also backed up. File backup is asynchronous.

To minimize tuning for log file capacity issues in the future, it is recommended that you ensure that there is sufficient disk space available for the following database configuration variables for DLFM_DB: LOGFILSIZ, LOGPRIMARY, and LOGSECOND.

Related concepts:

- "DB2 Data Links environment" on page 3
- "DB2 Data Links Manager typical setups" on page 11
- "DB2 clients in the Data Links Manager environment" on page 5
- "DB2 servers in the Data Links Manager environment" on page 5

Related reference:

- "Configuration parameters for database logging" in the *Data Recovery and High Availability Guide and Reference*

DB2 clients in the Data Links Manager environment

A DB2® client will connect as usual to a remote DB2 server and access the database.

The remote client can NFS mount a file system on AIX® or Solaris™ operating environment, or share a drive on Windows®, under the control of a Data Links Filesystem Filter that is installed on a Data Links server. This way, the client can access the files on the Data Links server directly.

Related concepts:

- "DB2 Data Links environment" on page 3
- "DB2 Data Links Manager typical setups" on page 11
- "Data Links server components" on page 4
- "DB2 servers in the Data Links Manager environment" on page 5

DB2 servers in the Data Links Manager environment

The Data Links Manager can be registered on a DB2® database running on a DB2 UDB server. You can register more than one Data Links Manager with a given DB2 database.

Data Links Manager does not support a partitioned DB2 Enterprise Server Edition database.

The AIX® and Solaris™ operating environments do not require DLFS to be mounted on the DB2 server, and the Windows® environment does not require DLFS to be net shared on the DB2 server. In each of these environments, the DB2 server communicates with the Data Links File Manager using a reserved TCP/IP port on the file server.

Related concepts:

- "DB2 Data Links environment" on page 3
- "DB2 Data Links Manager typical setups" on page 11
- "Data Links server components" on page 4
- "DB2 clients in the Data Links Manager environment" on page 5

File system paradigm

Current® e-business trends, such as e-commerce, supply chain management, and customer relationship management require applications that can integrate structured data from various DBMS and unstructured data that reside on file systems. Examples of such unstructured data are audio, video, and images traditionally stored in an assortment of file formats.

DB2® Data Links Manager allows you to use your existing and emerging file system based applications by leaving them untouched. DB2 Data Links Manager enables these same files to be integrated with database systems to meet the rigorous integrity, security, and transactional demands of e-business.

This advantage allows you the freedom to decide what setup best fits your organization. You do not have to disrupt your business or your customers' access to critical data in order to move it all over to an RDBMS. Moving this data away from the file system paradigm would also require an extensive rewrite of the application you use to access this data.

With Data Links Manager, you can continue using a file paradigm to store, access, and modify files instead of moving these files into a traditional database repository. Continuing to use a file system as a data storage option can provide many benefits.

Performance

The *store and forward* model of data is unacceptable for performance reasons. For example, it might be unacceptable for the database manager to materialize a Binary Large Object (BLOB) into a file, and the converse, each time the data needs to be accessed as a file. Also, data could be captured in high volumes, and you might not want to store this data in the database.

Data Links Manager does not add any overhead to the file READ and WRITE operations. Data Links ensures referential integrity of file references from the database by intercepting file operations such as OPEN, DELETE and RENAME that could compromise the integrity of the file reference. File READ and WRITE operations do not compromise referential integrity and are not part of the Data Links' scope of operations. Also, given that the number of file READ and WRITE operations generally outnumber the occurrences of OPEN, DELETE or RENAME on a file, the performance degradation, if any, is marginal.

Network considerations

You could be accessing data directly from a file server that is physically close to a workstation. For example, you can configure the file server so

that the network distance is much shorter to the user, compared to the database where all the BLOBs are stored. The number of bytes that flow for a large object are much larger than the number of bytes for an answer from a typical SQL query. Network distance between resources is therefore a significant consideration.

Isochronous delivery
You could be using an application that uses a stream server because it has real-time requirements for delivery and capture. This is known as isochronous delivery. An example of isochronous delivery might be a video server that delivers high-quality (or ″jitter-free″) video to a client workstation in real time. In these kinds of applications, it is likely that such data will not be moved into or out of the database as a BLOB, but rather stay on the file server for immediate access.

Cost If you are considering using a database as a repository, you should consider first the expense of rewriting applications that currently use standard file I/O semantics. Your applications could use existing tools that work with the file paradigm. Replacing these tools can also be expensive. Using Data Links Manager requires little if any modification of existing file system applications.

The cost of administration of a database is reduced as the large objects are outside the database and the size of the database is more manageable. As the database contains only pointers to files (as DATALINK column values) it takes less time to backup the database. During the backup, DB2 checks with DLFM to ensure that the files linked to this database are backed up. The DLFM starts asynchronous backup of the files after they are linked to the database.

Related concepts:

- "DB2 Data Links Manager" on page 2
- "DB2 Data Links Manager and your applications" on page 7

DB2 Data Links Manager and your applications

DB2® Data Links Manager is a candidate for any application that involves processing information from multiple heterogeneous sources that include databases and file systems, where it is required that this information be consistent between the different sources, secure, accurate, and timely.

In addition to e-commerce, customer relationship management, and supply chain management e-business, Data Links Manager can be used effectively in:

- Medical applications, in which a file server stores X-rays and a database stores their attributes.
- Entertainment industry applications that perform asset management of video clips. A file server stores video clips, but a database stores the clips' attributes. Access control is required for accessing the video clips based on database privileges for accessing the meta-information.
- World Wide Web applications that manage millions of files, and allow access control that is based on database privileges.
- Financial applications, which require distributed capture of check images and a central location for those images.
- CAD applications, where engineering drawings are kept as files and a database stores their attributes. Queries can be run against the drawing attributes.

Many of these applications need search capabilities to find the data in the files. These search capabilities, however, do not require physically bringing the data into the database system because their raw content is not needed for the query. Typically, you would extract features of an image or a video and store them in the database for performing a search on the extracted features. The ability to store a *reference* to such files and parametric data that describes their contents is the approach these applications use to combine the search capabilities of SQL with direct manipulation of raw data.

The DB2 relational extenders for text, voice, image and so on provide this functionality. The extenders allow you to create special indexes on the data and to search this data. This data can be stored either in DB2 or through DB2 Data Links in a file system.

Data Links Manager can provide all these capabilities even if the data is not in a database, and it can be used in conjunction with the DB2 relational extenders' search features to search on this data as well as perform parametric searches. Additionally, the data and the indexes created by the DB2 extenders can be kept synchronized.

Central administration point:

Data Links Manager simplifies many of the tasks associated with managing external files that are logically integrated with database information. For instance, Data Links Manager ensures that a backup of a database is coordinated with a backup of all the files referenced in that database, such as a point-in-time image which can be captured for the combination of database and file data.

Also, restoring the database from a backup results in Data Links Manager automatically restoring the corresponding content of the files, thereby guaranteeing consistency. Contrast this with other systems where the onus of keeping the database and file systems synchronized is left to the database administrator and can be error prone. That setup has a potential of jeopardizing the integrity of the information and the application.

Related concepts:

- "DB2 Data Links Manager" on page 2
- "File system paradigm" on page 6

DATALINK data type

Data Links technology uses the DATALINK data type, implemented as an SQL data type in DB2® Universal Database, which references an object stored external to a database. You can use the DATALINK data type just like any other SQL data type to define columns in tables. The DATALINK type is part of the SQL standard and is applicable across standard-conformant database products.

In File System Migrator (FSM), NT File System (NTFS), Journaled File System (JFS) and UNIX® File System (UFS) environments the DATALINK values encode the name of a Data Links Manager server containing the file and the filename in terms of a Uniform Resource Locator (URL).

A URL is a text string of the general format:

```
http://www.ibm.com/datalinks/datalinks.txt
```

DB2 validates the DATALINK value (file reference), just as it does for any SQL data value stored in the database. You register a set of known Data Links Manager servers. The only Data Links Manager server names that you can specify in a DATALINK value are those that have been registered to a DB2 database. Although Data Links uses a URL syntax to reference a file, it does not mean that the Data Links Manager server also functions automatically as a web server.

Even though the DATALINK value represents an object that is stored outside the database system, you can use SQL queries to search parametric data to obtain the file name that corresponds to the query result. You can store attributes in tables, such as indexes on files containing video, image, text, or other media formats, along with the DATALINK value. With a central repository of files on a file server and DATALINK data types in a database, you can obtain an inventory of its contents and devise strategies to get at the information you need.

An application designer can use Data Links to maintain a reference to an existing operating system file in a column of a DB2 table. This reference is stored through a the DATALINK data type using a URL syntax. Other columns of this table would generally maintain meta data about the linked files.

Typically, the application programmer would insert rows in this table with meta data about the file, and its file reference (URL syntax) in the DATALINK column. The application would then typically use an SQL query against this table on the meta data columns to locate the files of interest, retrieve the file reference in the DATALINK column, and then use that URL to directly access the file using the native APIs of the file system or through a browser.

For the application to update or delete a linked file, it must first unlink the file from the DB2 UDB table in which it is referenced, but only if you are not using the update-in-place methodology to perform the file update. You can choose a variety of methodologies for updating linked files: the unlink/update/relink, the update in place, or the replacement method.

For the application to update or delete a linked file, it must first unlink, assuming you have used the method to link a file that requires you to unlink it, the file from the DB2 UDB table before the operation is allowed to proceed. Multiple DATALINK columns can be defined for a single DB2 UDB table.

Data Links Manager treats information residing in file systems as though it was logically within the database, so you are not required to make any changes to existing applications. DB2 UDB's object-relational capabilities allow an application designer to write UDFs that process files that are either stored within BLOBs, stored as a reference in a DATALINK column, or stored as a reference in a UDT which is a Distinct Type mapping to the DATALINK type.

If files are stored within BLOBs and are currently used in existing applications, then the potential exists for synchronization problems between the BLOB and native file information if the BLOB is simultaneously updated by different users *outside* of the database when the BLOB is materialized as an external file, and updated through some application which only operates on files. When objects are updated outside of the database *not* part of a single database unit of work, there is always the potential for one update overlaying another. With some of the serialization techniques built into Data Links (for example, using the update in place feature), this problem is avoided.

Therefore, while both the BLOB and DATALINK types support file processing through the database, they address different application requirements, and are complementary in nature. DB2 UDB is unique in the industry in offering the customer these two choices to best serve the custom demands of their application.

Data Links Manager has been designed to support a distributed computing environment, with capabilities that include the following:

- A DATALINK column in a DB2 UDB table can reference one or more file systems spread over one or more file system servers associated with different operating systems such as AIX® and Windows® 2000.
- A single Data Links Manager can be associated with DATALINK columns in one or more DB2 UDB databases.
- Uni-directional and bi-directional replication of linked files is supported in an atomic, automatic, and consistent way in conjunction with DB2 UDB's database replication capabilities through DB2 DataPropagator™.

Related concepts:

- "DB2 Data Links Manager" on page 2
- "File system paradigm" on page 6
- "DB2 Data Links Manager and your applications" on page 7
- "Updating approaches overview" in the *DB2 Data Links Manager Administration Guide and Reference*

Related reference:

- "Updating approaches summary" in the *DB2 Data Links Manager Administration Guide and Reference*

Registry variable size for DATALINK columns

Any DB2® Database using at least one DATALINK column in V8.1 will require an increase in the APP_CTL_HEAP_SZ registry variable in order to avoid failures in such utilities as Reconcile and Load.

The default for APP_CTL_HEAP_SZ is 128 (4KB pages). It is recommended that you increase this to 256 in a DB2 database using DATALINK column(s). The following command can be used to increase this value as described:

```
db2 update db cfg for <dbname> using APP_CTL_HEAP_SZ 256
```

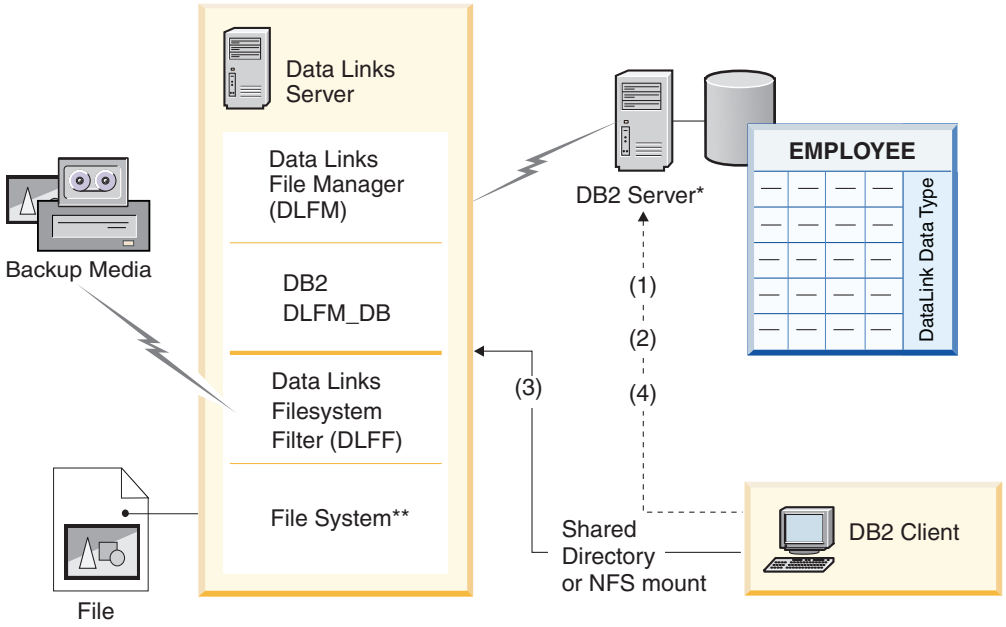
If you have already increased this value for other reasons, it is recommended that you further increase this value by 128. (So, if you already are using 256, the addition of one or more DATALINK columns would mean further increasing this setting to 256+128=384).

Related concepts:

- "DATALINK data type" on page 8
- "DB2 Data Links Manager typical setups" on page 11

DB2 Data Links Manager typical setups

Figure 1 shows an overview of the interaction between a DB2® server, the DB2 Data Links Manager components, the backup media, and a remote client application in FSM on AIX®, NTFS, JFS, and UFS environments.



*Single-partitioned database system

**NTFS on Windows, JFS on AIX or UFS on Solaris

Figure 1. Overview of Data Links Manager Processing (FSM on AIX, NTFS, JFS, or UFS environments)

In this example, a client application connects to a database with a DATALINK data type, selects a DATALINK value from this database, and updates the data file as follows:

1. The client application issues a **CONNECT** statement to connect to a database on a DB2 server.
2. The application then issues a **SELECT** statement that contains a DATALINK column. For example:

   ```
   select dlurlpath(dl1) into :var_dl1 from EMPLOYEE
   ```

3. The application then copies the `:var_dl1` file to the `new_version` file over a shared drive on Windows® or an NFS mount on AIX or Solaris™ operating environment.
4. Then the application edits the `new_version` file. To save the changes in the database, the application would issue an **UPDATE** statement. For example:

   ```
   update EMPLOYEE set dl1=dlvalue(:new_version)
   commit
   ```

Related concepts:

- "DB2 Data Links Manager" on page 2
- "DB2 Data Links environment" on page 3

Chapter 2. Installing Data Links Manager on Windows

Before you install DB2 Data Links Manager (Windows)

Read this information before installing DB2® Data Links Manager.

System requirements

- **Windows® NT.** You must be running Windows NT® Version 4.0 with Service Pack 6 or later.
- **Windows 2000.** You must be running Windows 2000 (5.00.2195) with Service Pack 1 or later, RC 1.1.

To check the level of the operating system, click on **My Computer** and select **Help —> About Windows** from the menu bar.

NTFS formatted drive

You must have at least one Windows File System (NTFS) formatted drive other than the system drive that will be controlled by a Data Links Filesystem Filter (DLFF). During the installation, you can select the drives that you want to be controlled by a DLFF. If you do not have a drive that was formatted for NTFS, you will not be able to perform the installation.

A separate NTFS drive is also required if you want to store backups of linked files on a local file system.

To view a list of the NTFS formatted drives on your system:

Windows NT

Click **Start** and select **Programs —> Administration Tools (Common)—> Disk Administrator**.

Windows 2000

Click **Start** and select **Settings —> Control Panel**. Click **Administrative Tools**. Click **Computer Management** and then select **Disk Management**.

You can either convert an existing file system to NTFS, or create one. To convert an existing file system to NTFS, enter the following command:

```
convert x: /fs:ntfs
```

where *x:* represents the drive that you want to convert to NTFS.

Run this command from a command prompt window on a drive other than the one that you are converting to NTFS.

You can create an NTFS partition using the Windows NT Disk Administrator tool or Windows 2000 Disk Management.

Migrating from previous versions

Registry variables offer more function and flexibility than environment variables. However, because of this, it is possible that migration will not be performed exactly as expected. The registry variables should be checked using the **db2set** command after migration.

Data Links server security

In releases prior to DB2 Data Links Version 8.1, there were no security

controls on linking a file. If you migrated from a previous release, you will be given the option at DLFM migration time to enable these security controls on your existing DLFM server(s).

Migrating from DB2 Data Links Version 6.1, 7.1, 7.2, or 8.1 to DB2 Data Links Manager Version 8.2

To migrate from a previous version of DB2 Data Links to DB2 Data Links Manager Version 8.2:

1. Prepare your DB2 and DLFM databases for migration. For example, you can backup your existing databases.
2. Install DB2 Version 8 on your DB2 server and Data Links Manager server machines.
3. As the Data Links Manager Administrator, run the **db2dlmmg** command to migrate the existing dlfm_db database schema to the new version.

When you migrate to DB2 Data Links Manager Version 8, the following environment variables will be converted to DB2 registry variables:

```
DLFM_INSTALL_PATH
DLFM_PORT
   DLFM_BACKUP_DIR_NAME (1)
DLFM_BACKUP_TARGET (2)
DLFM_BACKUP_TARGET_LIBRARY (3)
```

Notes:

1. This variable is used only if a local file system is the backup target.
2. Used to indicate the type of backup target used. Possible values for this variable are LOCAL, TSM, or XBSA.
3. Used to indicate the XBSA support code library only if the DLFM_BACKUP_TARGET is set to XBSA. The support code library must be fully qualified and must include the shared object name. The name of the shared object is available from the vendor suppling the XBSA compliant shared library.

Registry variable size for DATALINK columns

Any DB2 database using at least one DATALINK column in Version 8 will require an increase in the APP_CTL_HEAP_SZ registry variable to avoid failures in such utilities as Reconcile and Load. The default for APP_CTL_HEAP_SZ is 128 (4KB pages). It is recommended that you increase this to 256 in a DB2 database using DATALINK column(s). The following command can be used to increase this value as described:

```
db2 update db cfg for <dbname> using APP_CTL_HEAP_SZ 256
```

If you have already increased this value for other reasons, it is recommended that you further increase this value by 128. If you already use 256, the addition of one or more DATALINK columns would mean further increasing this setting to 256+128=384).

DLFM database migration utility

The DLFM database migration utility, **db2dlmmg**, converts an existing DLFM database from its DB2 Version 6.1, Version 7.1, or Version 7.2 format to the DB2 Version 8 format. The only DB2 database with which this utility should be run is the one that resides on a DLFM server. This database is called DLFM_DB, and by default belongs to the DB2 instance called DLFM, owned by the Data Links Manager Administrator. Each occurrence of this database, one per DLFM server, must be migrated independently using the **db2dlmmg** utility.

The **db2dlmmg** utility is installed in the `x:\sqllib\bin` directory, where x: represents the drive where the Data Links Manager is installed.

Before running the **db2dlmmg** utility, you must have installed the DB2 Version 8.2 Data Links Manager. You should not attempt to run the **db2dlmmg** utility from prior releases against a DLFM_DB database. You must also already have run the DB2 Instance Migration (**db2imigr**) utility against the DLFM database instance.

The DLFM database migration utility performs the following basic steps:

1. Stops the DLFM if it is running.
2. Requests how you would like your Version 8.2 Data Links Manager linked file security controls set up.
3. Verifies that the current DLFM_DB contents are in a valid pre-Version 8 format.
4. Automatically backs up the current DLFM_DB database.
5. Increases the amount of log space reserved for this database.
6. Creates new buffer pools and tablespaces.
7. Creates and alters tables and indexes.
8. Modifies permissions of linked files and updates file security descriptor information in the DLFM_DB, as required.
9. Moves the largest DLFM_DB table into one of the new tablespaces.
10. Sets up the linked file security controls as specified in step 2.
11. Rebinds the DLFM executables to the modified database.

If the migration utility detects an error during its processing, it will provide an error message with instructions on how to proceed. In some cases, you will be able to correct the problem and simply re-run **db2dlmmg**. In many cases, however, you will be instructed to *first* restore the original DLFM_DB (backed up in step 4 above), and then re-run **db2dlmmg**. The backup in step 4 is stored in the location specified by the DLFM configuration variables DLFM_BACKUP_TARGET and DLFM_BACKUP_DIR_NAME. To restore the original database, you run the DB2 restore utility as follows:

- `db2start`
- `db2 restore database dlfm_db from <backup-directory>[taken at <date-time>] without rolling forward`

  <backup-directory> represents the fully qualified path specified in DLFM_BACKUP_DIR_NAME, and taken at <date-time> must be specified if there are multiple backup images under <backup-directory>.

To view the values of the configuration variables DLFM_BACKUP_TARGET and DLFM_BACKUP_DIR_NAME, enter the commands:

- `db2set DLFM_BACKUP_TARGET`
- `db2set DLFM_BACKUP_DIR_NAME`

If the value of the DLFM_BACKUP_TARGET variable is either ″TSM″ or ″XBSA″, the required restore command above will be different. Refer to the description of the RESTORE utility for accessing backups in TSM or an XBSA archive server.

To run the DLFM database migration utility, perform the following steps on each DLFM server:

1. Log in to the DLFM server using the Data Links Manager Administrator id.
2. Ensure sufficient free space is available in the filesystem pointed to by the DLFM_BACKUP_DIR_NAME configuration variable. There must be at least enough space for a full backup of the DLFM_DB database. (Allow enough space for at least two DLFM_DB backups. See step 7 below for details.)
3. Ensure sufficient free space for the increased transaction log files in the DLFM instance filesystem. The LOGPRIMARY configuration variable will be increased to 6 (if previously less than 6). The LOGFILSIZ configuration variable will be increased to 2000 (if previously less than 2000). You can view the current settings for these variables by entering the **db2 get db cfg for dlfm_db** command.
4. Ensure sufficient additional free space for work files (used by **db2dlmmg**) in the DLFM instance filesystem. You can use the amount of space currently used by the DLFM_DB as an estimate of this additional amount of space required.
5. Run the migration utility by entering the **db2dlmmg** command.
6. Allow the migration utility to run *uninterrupted* to completion. Depending upon the size of the DLFM_DB, it can run for several minutes or possibly as long as an hour. Progress of the migration will be reported to the screen with various status messages. In the event of an error, follow the instructions documented for the given error messages, and then re-run the **db2dlmmg** command.
7. Once the migration utility completes successfully, you should manually take a full backup of the DLFM_DB for full recoverability of the DLFM server under Version 8.2 (The migration utility does not do this automatically.)

Some important points to note:

- Once you have completed the above procedure, you will be able to perform all Version 8.2 DLFM operations. You should issue the *dlfm start* command to verify that the Version 8.2 Data Links File Manager starts successfully with the new DLFM_DB. To verify that the DLFM is running, you can check for the DLFM processes in the Task Manager.
- You should also then either follow the installation validation instructions described in the Data Links Manager installation documentation or use your existing Data Links application to verify correct operation of the Data Links Manager.
- Do *not* attempt to restore *any* backups of the DLFM_DB from prior to the migration. The pre-Version 8 backups are no longer usable with the Version 8.2 Data Links Manager.
- If you have problems with the migration, you should contact IBM® Service. *Never* attempt to manually update the contents of the DLFM_DB except with the assistance of IBM Service.

Enable drive sharing

Each drive that you plan to be controlled by a Data Links Filesystem Filter (DLFF) must be enabled for sharing.

To enable a drive for sharing:

1. Click **Start** and select **Programs —> Windows Explorer**.

2. Right-click on the drive that you want to share and select **Sharing**. If you are already sharing the drive that you want to be controlled by a DLFF, skip to step 5.
3. Select **Shared As**.
4. Click **New Share**.
5. Enter a share name for this drive in the **Share Name** field and click **OK**.
6. Click **Permissions**.
7. Select the **Everyone** option.
8. Click **Type of Access** and select the **Full Control Option**.
9. Click **OK** to register the new share name.

Memory requirements

There must be at least 64 MB of RAM available to your system. To check the amount of memory available to your system, select **My Computer**, click the right mouse button, and select the **Properties** option.

Synchronize system clocks

The system clocks on the Data Links server and the DB2 server must be, and remain, synchronized for linked files in the DATALINKS columns with the READ PERMISSION DB option. Synchronization of clocks is essential for the Data Links token expiry interval to work correctly. The token expiry interval is a database configuration parameter that controls how long a selected DATALINK value (consisting of a URL with an embedded file authorization token) can be used.

To set the time for a machine's system clock:

1. Click **Start** and select **Settings —> Control Panel**.
2. Double-click the **Date/Time** icon.
3. Set the local system time using the spin buttons in the **Time** box. Remember to set this time equal to the local system time on the DB2 server.
4. Click the **Time Zone** tab and select the appropriate time zone from the drop down box. Remember to use the same time zone setting on all servers.
5. Click **OK**.

Version levels of DB2 Data Links and DB2 UDB

Version levels of DB2 Data Links and DB2 Universal Database™ can be any combination of Version 6.1, 7.1, 7.2, 8.1 and 8.2 . For example, DB2 can be at Version 6.1 and Data Links Manager can be at Version 8.2 .

To check the version of DB2 that resides on a workstation, enter the **db2level** command.

If DB2 is at the higher version, such as Version 8.2 , the Data Links Manager features introduced in the new version will not be available when you connect to a Data Links Manager at Version 6 or 7. You will receive an SQL error if you attempt to use the Version 8 features.

User account rights

To perform the installation of Data Links File Manager, you need to login as a user with following privileges:

1. Defined on the local machine
2. Belongs to the *Local Administrators* group
3. Has the following advanced user rights:

- Act as part of the operating system
- Increase quotas
- Replace a process level token
- Create a token object
- Log on as a service

For more information on Windows user rights, refer to the Windows online help.

dlmadmin username

During the installation, you will be asked to provide a user account that will be used as the DB2 Data Links Manager Administrator superuser.

By default, the setup program will set up a user account with the username *dlmadmin* and prompt you for a password. You can accept this default value, specify an existing account, or create a different user account by changing the default value. This user account is also used to run the DLFM as a Windows service.

If the *dlmadmin* user account already exists on your system, you must use the password that was previously set for this user account.

If you want to specify an existing user account, the account you specify must:

- Be defined on the local machine.
- Belong to the *Local Administrators* group.
- Have the *"Back up files and directories"* and the *"Restore files and directories"* user rights.
- Have the following advanced user rights:
  - Act as part of the operating system.
  - Increase quotas.
  - Replace a process level token.
  - Create a token object.
  - Log on as a service.
- Have a username that is 20 characters or less.

If you want to create a new user account using the setup program, you must ensure that the username you specify is 20 characters or less.

On Windows, the dlmadmin user account has the same privileges with regard to files linked using Data Links as a root user does on UNIX® for most functions.

DLFM user account

The DLFM user account is the DB2 Data Links Manager Administrator ID. In addition to the DB2 Data Links Manager Administrator superuser account (dlmadmin), the DLFM user account is also created during installation for use by the Data Links Manager Administrator as well as by the Data Links File Manager. The DLFM user account is the owner of all READ PERMISSION DB files.

The DLFMXGRP group is created for use with the update in place functionality for any file linked to a DATALINK column defined with WRITE PERMISSION ADMIN. You should not add any other users to this group; the DLFM user should be the only user account in this group. The DLFM user account should never be used to create a file in a DLFF

controlled file system, as this can be misinterpreted as a linked file for a READ PERMISSION DB column reference.

TCP/IP port number
Data Links File Manager needs a TCP/IP port to communicate with DB2 servers. By default, the setup program will generate a value for you. You can use this value or provide your own. You will need to know this port number to verify the installation.

To review the TCP/IP ports that are in use on a machine, open the `services` file. The services file is located in the *x:*`\winnt\system32\drivers\etc` directory (where *x:* represents the drive where you installed Windows).

Determine hostname
You must determine the names of each of your DB2 servers and Data Links servers. You will need to know these hostnames to verify the installation. When connecting to a Data Links File Manager (DLFM), the DB2 UDB server internally sends the following information to the DLFM:

- Database name
- Instance name
- Hostname

The DLFM then compares this information with its internal tables to determine whether the connection should be allowed. It will allow the connection only if this combination of database name, instance name, and hostname has been registered with it, using the **dlfm add_db** command. The hostname that is used in the **dlfm add_db** command must exactly match the hostname that is internally sent by the DB2 UDB server.

To obtain these hostnames, enter the **hostname** command on your DB2 Data Links and DB2 UDB servers. For example, this command might return *dlmserver* on your Data Links server.

Now enter the **nslookup** *dlmserver* command, where *dlmserver* represents your hostname. This command should return output similar to the following:

```
Server: dnsserv.ibm.com
Address: 9.21.14.135
Name: dlmserver.ibm.com
Address: 9.21.51.178
```

The `Name: dlmserver.ibm.com` entry is your hostname name.

Repeat these steps on each Data Links Manager and DB2 UDB server.

Data Links replication
Data Links Manager Version 8.1 introduced two new registry variables, DLFM_START_ASNCOPYD and DLFM_ASNCOPYD_PORT. During installation, you will be prompted to enable the Data Links Manager Replication daemon. If you plan to use Data Links Replication, you should enable the Replication daemon during the installation. You can also enable it after installation by setting the registry variables (DLFM_START_ASNCOPYD and DLFM_ASNCOPYD_PORT) and restarting the DLFM.

Related concepts:

- "DB2 Data Links Manager" on page 2
- "Actions performed by the DB2 Setup wizard (Windows)" on page 21

- "Introduction to Data Links Manager security" in the *DB2 Data Links Manager Administration Guide and Reference*

Related tasks:

- "Installing DB2 Data Links Manager (Windows)" on page 20
- "Migrating DB2 UDB (Windows)" in the *Quick Beginnings for DB2 Servers*
- "Enabling the Data Links Manager Replication daemon" in the *DB2 Data Links Manager Administration Guide and Reference*

Installing DB2 Data Links Manager (Windows)

You can install DB2 Data Links Manager on Windows.

Prerequisites:

Before you install DB2 Data Links Manager, you must

- Read "Before you install DB2 Data Links Manager for Windows".
- Log on to the system with a user account that belongs to the *Local Administrators* group.
- Shut down any other programs that are currently running.

Procedure:

To install DB2 Data Links Manager:

1. Insert the CD-ROM into the drive. The auto-run feature will automatically start the setup program. If not, run **setup.exe** from the root directory of the CD-ROM.
2. The Launchpad window opens.
3. Click **Install** and respond to the setup program's prompts. Online help is available to guide you through the remaining steps. You can invoke the online help by clicking **Help** or pressing **F1** at any time.

   You can click **Cancel** at any time to stop the setup program.

If you want your DB2 product to have access to DB2 documentation either on your local computer or on another computer on your network, then you must install the DB2 Information Center. The DB2 Information Center contains documentation for DB2 Universal Database and DB2 related products.

Related concepts:

- "DB2 Data Links Manager" on page 2
- "Before you install DB2 Data Links Manager (Windows)" on page 13
- "Actions performed by the DB2 Setup wizard (Windows)" on page 21
- "DB2 Information Center" on page 92
- "DB2 Information Center installation scenarios" on page 93

Related tasks:

- "Verifying the DB2 Data Links Manager installation (Windows)" on page 23
- "Installing the DB2 Information Center using the DB2 Setup wizard (Windows)" on page 98

Actions performed by the DB2 Setup wizard (Windows)

The setup program performs the following actions:

1. Creates DB2® Data Links Manager program groups and items (or shortcuts).
2. Updates the DB2 registry variables with the following entries (only the most significant variables set during install are listed here):
   - DLFM_START_ASNCOPYD=NO // or YES if you enable the Data Links Manager Replication Daemon
   - DLFM_ASNCOPYD_PORT=*port_number*, where *port_number* represents the port number specified during the install process.
   - DLFM_BACKUP_TARGET=LOCAL // Can also be TSM or XBSA
   - DLFM_PORT=*port_number*, where *port_number* represents the port number reserved for the Data Links File Manager.
   - DB2_HASH_JOIN=ON
   - DLFM_INSTALL_PATH=*x:*\sqllib\bin, where *x:* represents the Data Links Manager installation drive.
   - DB2INSTANCE=DLFM
   - DLFM_BACKUP_DIR_NAME=*x:*\dlfmbackup, where *x:* represents the Data Links Manager backup installation drive.

   You can use the **db2set –all** command to view all of the variables.
3. Creates and registers various services.
4. Sets up the Data Links Filesystem Filter driver.
5. Creates a DB2 (or database) instance called DLFM.
6. Creates a user account for the DB2 Data Links Manager Administrator, if specified account does not exist already. If the specified account already exists, then the setup program checks if it has the appropriate privileges.
7. Creates a user account for use by the Data Links File Manager. By default, this user account is created with the username DLFM and you will be prompted for a password. It is recommended that you change this default password after installing DB2 Data Links Manager.
8. Updates the registry with the DLFM user account password that you were prompted for during the installation. However, if you change the password for the default DLFM user account or change the default user account name DLFM, you must update the registry with the new password:

   ```
   dlff set dlfmaccount DLFM
   ```

   Once you perform actions with the DLFM user account or whatever you changed the user account to, you should not change the username that has to do with this account. You can use this command to periodically change the password for this user account.
9. Creates the special write group, dlfmxgrp and updates the registry with this group information. Once any file is linked to this group, you cannot change the group name. You can manually create this new group (and update the registry):

   ```
   dlff set dlfm_write_group newgroup
   ```
10. Reserves the port number you specified for use by the Data Links File Manager and added an entry to the services file that is similar to the following:

    ```
    db2cDLFM     50100/tcp
    ```

11. Creates a DB2 database, called DLFM_DB. This database is used by the Data Links File Manager, which keeps track of all the files linked from the host DB2 database(s). This database was automatically backed up after it was created.
12. By default, sets link security controls to ENABLED. Use the **dlfm set link security off** command to disable this feature and the **dlfm set link security on** command to re-enable it.

Related tasks:

- "Installing DB2 Data Links Manager (Windows)" on page 20
- "Verifying the DLFM_DB was successfully created and catalogued (Windows)" on page 22

Verifying the DLFM_DB was successfully created and catalogued (Windows)

Once the setup program has finished installing DB2 Data Links Manager, you must restart your system. After restarting, you should ensure that it successfully created and catalogued the DLFM_DB database.

Prerequisites:

Log on to the system as the DB2 Data Links Manager Administrator

Procedure:

To verify that the DLFM_DB database was successfully created and catalogued:

1. Retrieve the entry for the DLFM_DB database in the System Database Directory by entering the following command:

   ```
   db2 list database directory
   ```

   This command should return output similar to the following:

   ```
   System Database Directory

   Number of entries in the directory = 1

  Database 1 entry:

   Database alias                 = DLFM_DB
   Database name                  = DLFM_DB
   Local database directory       = C:\DLFM
   Database release level         = 9.00
   Comment                        =
   Directory entry type           = Indirect
   Catalog node number            = 0
   ```

Related concepts:

- "Before you install DB2 Data Links Manager (Windows)" on page 13

Related tasks:

- "Verifying the DB2 Data Links Manager installation (Windows)" on page 23
- "Installing DB2 Data Links Manager (Windows)" on page 20

Verifying the DB2 Data Links Manager installation (Windows)

You will configure a DB2 Data Links Manager environment to control files that are linked to DATALINK columns in a table of a database on a DB2 Universal Database server.

Procedure:

To verify the installation of Data Links Manager on Windows:

1. Create a test environment on the DB2 server.
2. Create a test environment on the DB2 Data Links server.
3. Register the Data Links Server with the DB2 database.
4. Verify the sample file is controlled by DLFF.
5. Verify the sample file is accessible.
6. View the sample file.

Related tasks:

- "Creating a test environment on the DB2 server (Windows)" on page 23
- "Creating a test environment on the DB2 Data Links server (Windows)" on page 25
- "Registering the Data Links server with the DB2 database (Windows)" on page 29
- "Verifying the sample file is controlled by DLFF (Windows)" on page 30
- "Verifying the sample file is accessible (Windows)" on page 31
- "Viewing the sample file (Windows)" on page 33
- "Installing DB2 Data Links Manager (Windows)" on page 20

Installation verification tasks

Creating a test environment on the DB2 server (Windows)

Creating a test environment on the DB2 server is part of the larger task of *Verifying the DB2 Data Links Manager installation*.

Prerequisites:

- A valid DB2 user account that has System Administrative (SYSADM) authority on the `VALIDATE` instance that you will create. By default, any user account that belongs to the *Local Administrators* group has SYSADM authority on an instance.

Procedure:

To create a test environment on the DB2 UDB server:

1. Log on to the system with a user account that belongs to the *Local Administrators* group.
2. Create an instance on the DB2 server using the **db2icrt** command. This instance will contain a database, which you will create, where tables containing columns of the DATALINK data type will reside.

   In the example, an instance called `VALIDATE` is created by entering the following command:

   ```
   db2icrt validate
   ```

3. Ensure that the VALIDATE instance is the current instance by entering the following command:

   ```
   db2 get instance
   ```

   This command should return the following output:

   ```
   The current database manager instance is:  VALIDATE
   ```

   If you do not receive this output, enter the following commands:

   ```
   set DB2INSTANCE=VALIDATE
   db2 get instance
   ```

4. Set the DATALINKS database manager configuration parameter to *YES* in the VALIDATE instance's configuration file by entering the following command:

   ```
   db2 update dbm cfg using datalinks yes
   ```

   In the event that you want to disable the DB2 Data Links Manager functionality on your DB2 server, you set the DATALINKS database manager configuration parameter to *no*.

5. Start the VALIDATE instance by entering the **db2start** command.

   Note: If you change a setting in an instance's database manager configuration file, you must ensure that you stop and restart the instance (using the **db2stop** and **db2start** commands) for the changes to take effect. In the example, the VALIDATE instance was not started, so the **db2start** command was issued.

6. Create a database using the **db2 create database** command. This database will contain a table using the DATALINK data type.

   For the example, create a database called STAFF by entering the following command:

   ```
   db2 create database staff
   ```

7. Connect to the STAFF database by entering the following command:

   ```
   db2 connect to staff
   ```

8. Create a table called EMPLOYEE, in the STAFF database that you just created, that has a column defined with a DATALINK data type by entering the following command:

   ```
   db2 "create table employee (id int, fname varchar(30),
    lname varchar(30), picture datalink linktype url file
    link control integrity all read permission db write
    permission blocked recovery yes on unlink restore)"
   ```

9. Terminate all connections to this database by entering the following command:

   ```
   db2 connect reset
   ```

10. Log out.

Now you can create a test environment on the DB2 Data Links server.

Related tasks:

- "Creating a test environment on the DB2 Data Links server (Windows)" on page 25

Related reference:

- "CREATE DATABASE Command" in the *Command Reference*
- "db2icrt - Create Instance Command" in the *Command Reference*

Creating a test environment on the DB2 Data Links server (Windows)

Creating a test environment on the DB2 Data Links server is part of the larger task of *Verifying the DB2 Data Links Manager installation*. After creating a test environment on the DB2 server, you must create a test environment on the DB2 Data Links server.

Procedure:

To create a test environment on the Data Links server:

1. Register the drive with the Data Links File Filter
2. Register the DB2 database with the Data Links File Manager.
3. Authorize a DB2 user account to link a file.
4. Create a sample file for Data Links File Manager.

Related tasks:

- "Registering the drive with the Data Links Filesystem Filter (Windows)" on page 25
- "Registering the DB2 database with the Data Links File Manager (Windows)" on page 26
- "Authorizing a DB2 user account to link a file (Windows)" on page 27
- "Creating a sample file for DB2 Data Links Manager (Windows)" on page 28
- "Creating a test environment on the DB2 server (Windows)" on page 23

Registering the drive with the Data Links Filesystem Filter (Windows)

Registering the drive with the Data Links Filesystem Filter is part of the larger task of *Creating a test environment on the DB2 Data Links server*.

A Data Links Filesystem Filter (DLFF) is created by the setup program on the NTFS formatted drives that you selected during the installation.

Prerequisites:

Log on to the system as the DB2 Data Links Manager Administrator.

Procedure:

To register a drive with the DLFF:

1. Ensure that the Data Links File Manager started successfully as follows:
   a. Click **Start** and select **Settings —> Control Panel**.
   b. On Windows NT, click **Services**. On Windows 2000, click **Administrative Tools** and then click **Services**. The Services window opens.
   c. Ensure that the status for the **DB2 Data Links File Manager** service is set to **Started**.
   d. Open the Windows Task Manager and verify that the following dlfm processes are running:

```
dlfm_ar_ag.exe
dlfm_ar_ag.exe
dlfm_archived.exe
```

```
dlfm_cmgrd.exe
dlfm_delgrpd.exe
dlfm_gcd.exe
dlfm_mon_wd.exe
dlfm_upcalld.exe
dlfm_wd.exe
```

2. Ensure that the drive you reserved for the Data Links server is under the control of a DLFF by entering the **dlff list** command. This command will list all the drives that are under the control of a DLFF.

   For the example, this command should return the following output:

   ```
   LogicalDrives = D:
   ```

   If there are no drives listed by the **dlff list** command, the DLFF will take over the control of the drive by entering the following command:

   ```
   dlff add drivename
   ```

3. Register the share name of a drive that is under the control of a DLFF by entering the following command:

   ```
   dlff add d:
   dlfm add_prefix \share name
   ```

   where *share name* represents the shared name of the drive that is under the control of a DLFF, and *d:* represents the drive that is under the control of the DLFF.

   For example, register the Data Links server to use the DLFF on the *ddrive* (which is the share name of the *d:* drive) by entering the following command:

   ```
   dlfm add_prefix \ddrive
   ```

4. Log out.

Now you can register the DB2 database with the Data Links File Manager.

Related tasks:

- "Verifying the DB2 Data Links Manager installation (Windows)" on page 23
- "Registering the Data Links server with the DB2 database (Windows)" on page 29
- "Registering the DB2 database with the Data Links File Manager (Windows)" on page 26

Related reference:

- "dlfm add_prefix command" in the *DB2 Data Links Manager Administration Guide and Reference*
- "dlff add command (Windows operating system)" in the *DB2 Data Links Manager Administration Guide and Reference*
- "dlff list command (Windows operating system)" in the *DB2 Data Links Manager Administration Guide and Reference*

Registering the DB2 database with the Data Links File Manager (Windows)

Registering the DB2 database with the Data Links File Manager is part of the larger task of *Creating a test environment on the DB2 Data Links server*.

Prerequisites:

Log on to the system as the DB2 Data Links Manager Administrator.

Procedure:

To register a new database with the Data Links File Manager:

1. Register the remote DB2 UDB database where the DATALINK type column was defined by entering the following command:

   ```
   dlfm add_db database instance hostname
   ```

   where:

   - *database* represents the database alias name of the remote database.
   - *instance* represents the instance where *database* resides.
   - *hostname* represents the hostname of the DB2 UDB server where *database* resides.

   The following command will register a database called `STAFF`, which resides in the `VALIDATE` instance on a DB2 UDB server with a hostname of `db2server.services.com`:

   ```
   dlfm add_db staff validate db2server.services.com
   ```

   Do not register the `DLFM_DB` when you run this command. The DLFM_DB is a local database that is used to keep track of files that are under the control of the Data Links File Manager.

   To list the registered database:

   ```
   dlfm list registered databases
   ```

2. Log out.

Now you can authorize a DB2 user account to link a file .

Related concepts:

- "Before you install DB2 Data Links Manager (Windows)" on page 13

Related tasks:

- "Verifying the DB2 Data Links Manager installation (Windows)" on page 23
- "Creating a sample file for DB2 Data Links Manager (Windows)" on page 28
- "Authorizing a DB2 user account to link a file (Windows)" on page 27

Related reference:

- "dlfm add_db command" in the *DB2 Data Links Manager Administration Guide and Reference*
- "dlfm list registered databases command" in the *DB2 Data Links Manager Administration Guide and Reference*

Authorizing a DB2 user account to link a file (Windows)

Authorizing a DB2 user account to link a file is part of the larger task of *Creating a test environment on the DB2 Data Links server*.

Prerequisites:

Log on to the system as the DB2 Data Links Manager Administrator.

Procedure:

To authorize a DB2 user account to link a file in the example *\ddrive\pictures* directory:

1. Run

   ```
   dlfm grant link privilege on dir \ddrive\pictures to
      user db2-username for db staff inst validate
      node db2server.services.com
   ```

   where *db2-username* must be the user account with which you log on when you perform the link operation (for example, using the SQL INSERT statement) on DB2.
2. To verify that your **dlfm grant** command was correctly specified:

   ```
   dlfm list registered users for directory \ddrive\pictures on
      db staff inst validate node db2server.services.com
   ```

   This command should return the *db2-username* that was specified above.
3. Log out.

By default, link security controls are ENABLED during installation. Use the **dlfm set link security off** command to disable this feature and the **dlfm set link security on** command to re-enable it.

Your next step is to create a sample file.

Related tasks:

- "Registering the DB2 database with the Data Links File Manager (Windows)" on page 26
- "Creating a sample file for DB2 Data Links Manager (Windows)" on page 28

Related reference:

- "dlfm grant command" in the *DB2 Data Links Manager Administration Guide and Reference*
- "dlfm set link security command" in the *DB2 Data Links Manager Administration Guide and Reference*

Creating a sample file for DB2 Data Links Manager (Windows)

Creating a sample file for DB2 Data Links Manager is part of the larger task of *Creating a test environment on the DB2 Data Links server*.

Prerequisites:

Log on to the system with any user account who is neither a DB2 Data Links Manager Administrator nor the DLFM user account created during installation for use by the Data Links File Manager. The DLFM user account is different from the DB2 Data Links Manager Administrator user account.

Procedure:

To create a sample file:

1. Create a directory on the drive that is under the control of a Data Links Filesystem Filter, to store files to be controlled by a DB2 server, by entering the following command:

   ```
   md x:\directory_name
   ```

   where

   - *x:* represents the shared drive that is under the control of a DLFF.
   - *directory_name* represents the name of the directory that you want to create.

The DLFM user account should never be the owner of any files or directories in a shared drive under the control of a DLFF. Linking READ PERMISSION DB files involves changing the ownership of such files to the DLFM user account. As such, the DLFM user account should not be used to manually create files in a shared drive under the control of a DLFF. In the example, create a directory called `pictures` on the d: drive by entering the following commands:

```
d:
cd \
md pictures
```

The directory you create must have the **Access Type** set to `Full Control`. This is the default for any new directory that you create on Windows.

If the directory that you have created does not grant all members of the EVERYONE group `Full Control`, enter the following command:

```
cacls d:\pictures /p everyone:f
```

2. Create a sample file called `psmith.bmp` in the `d:\pictures` directory, to be managed by the Data Links File Manager, by entering the following command:

```
echo "This is a picture of Paul Smith" > d:\pictures\psmith.bmp
```

3. Log out.

The sample file `psmith.bmp` is a text file, not a bitmap as the `.bmp` extension implies. For the purpose of verifying your installation, this file represents an employee's picture that will be inserted into a table that was defined with the DATALINKS data type.

Now you can register the Data Links server with the DB2 database.

Related tasks:

- "Verifying the sample file is accessible (Windows)" on page 31
- "Registering the DB2 database with the Data Links File Manager (Windows)" on page 26
- "Registering the drive with the Data Links Filesystem Filter (Windows)" on page 25

Registering the Data Links server with the DB2 database (Windows)

Registering the Data Links server with the DB2 database is part of the larger task of *Verifying the DB2 Data Links Manager installation*.

Prerequisites:

Log on to the DB2 server with a valid DB2 user account that has System Administrative (SYSADM) authority on the `VALIDATE` instance that you created. By default, any user account that belongs to the *Local Administrators* group has SYSADM authority on an instance.

Procedure:

To register the Data Links server with the remote DB2 UDB database where the DATALINK type column was defined earlier:

1. Enter the following command:

```
db2 get instance
```

This command should return the following output:

```
The current database manager instance is:  VALIDATE
```

If you do not receive this output, enter the following commands:

```
set DB2INSTANCE=VALIDATE
db2 get instance
```

2. Start the VALIDATE instance by entering the **db2start** command.
3. Register a Data Links server that will control the files that are linked by a DATALINK type column:

```
db2 "add datalinks manager for database database_alias
    using node hostname port port_number"
```

where:

- *database_alias* represents the database alias name of the database
- *hostname* represents the fully qualified hostname of the Data Links server
- *port_number* represents the port number that you have reserved for communications between the Data Links server and the DB2 server. You specified this port number during the installation of DB2 Data Links Manager.

You should have already registered the database on the DLFM side as well as having started up the DLFM service. Otherwise, this command will fail.

For the example, enter the following command:

```
db2 "add datalinks manager for database staff using node dlmserver.services.com port 50100"
```

4. Connect to the STAFF database by entering the following command:

```
db2 connect to staff
```

5. Insert an entry into the EMPLOYEE table that you created by entering the following command:

```
db2 "insert into employee values (001,'Paul','Smith',
   dlvalue('unc:\\unc_name\controlled_file'))"
```

where:

- *unc_name* represents the fully qualified location of the file that is under the control of a Data Links Filesystem Filter on the Data Links server.
- *controlled_file* represents the filename of the file that you want to control on the Data Links server.

For the example, enter the following command

```
db2 "insert into employee values (001,'Paul','Smith',==>
   dlvalue('unc:\\dlmserver.services.com\ddrive\pictures\psmith.bmp'))"
```

6. Log out.

Now you can verify the sample file is controlled by the DLFF.

Related tasks:

- "Verifying the sample file is controlled by DLFF (Windows)" on page 30
- "Registering the drive with the Data Links Filesystem Filter (Windows)" on page 25

Verifying the sample file is controlled by DLFF (Windows)

Verifying the sample file is controlled by DLFF is part of the larger task of *Verifying the DB2 Data Links Manager installation.*

Prerequisites:

Log on to the system using any user account other than the DB2 Data Links Manager Administrator or the Data Links File Manager (DLFM) user account.

Procedure:

To verify that the `psmith.bmp` sample file created earlier is under the control of the Data Links Filesystem Filter (DLFF):

1. Enter the following command:

   ```
   type \\unc_name\controlled_file
   ```

   where:

   - *unc_name* represents the fully qualified location of the file that is under the control of a DLFF on the Data Links Manager server.
   - *controlled_file* represents the filename of the file that that is under the control of a DLFF on the Data Links Manager server.

   For the example, enter the following command:

   ```
   type \\dlmserver\ddrive\pictures\psmith.bmp
   ```

   If the file is being controlled by the DLFM, you will see output similar to the following:

   ```
   \\dlmserver\ddrive\pictures\psmith.bmp
   Access is denied.
   ```

2. Log out.

Now you can verify the sample file is accessible.

Related tasks:

- "Registering the Data Links server with the DB2 database (Windows)" on page 29
- "Verifying the sample file is accessible (Windows)" on page 31

Verifying the sample file is accessible (Windows)

Verifying the sample file is accessible is part of the larger task of *Verifying the DB2 Data Links Manager installation on Windows*. You will now verify that the `psmith.bmp` sample file can be accessed while it is under the control of the Data Links File Manager.

Prerequisites:

Log on to the system with a valid DB2 user account that has System Administrative (SYSADM) authority on the `VALIDATE` instance that you created. By default, any user account that belongs to the *Local Administrators* group has SYSADM authority on an instance.

Procedure:

To verify the sample file is accessible:

1. Ensure that the `VALIDATE` instance is the current instance by entering the following command:

   ```
   db2 get instance
   ```

This command should return the following output:

```
The current database manager instance is:  VALIDATE
```

If you do not receive this output, enter the following commands:

```
set DB2INSTANCE=VALIDATE
db2 get instance
```

2. Start the VALIDATE instance by entering the **db2start** command.
3. Connect to the STAFF database by entering the following command:

   ```
   db2 connect to staff
   ```

4. Select the controlled file by issuing an SQL **SELECT** statement.

   For the example, enter the following command:

   ```
   db2 "select dlurlpath(picture) from employee where lname = 'Smith'"
   ```

   This command will return the full pathname with an access token of the form:

   *unc_name**access_token*;*controlled_filename*

   where:

   - *unc_name* represents the fully qualified location of the file that is under the control of a Data Links Filesystem Filter on the Data Links server.
   - *access_token* represents a message authentication code (MAC) and is required in order to read the file. The access token is generated by the database manager and is valid for a limited amount of time determined by the dl_expint database configuration parameter.
   - *controlled_filename* represents the name of the file that is under the control of a Data Links Filesystem Filter.

   For the example, the access token that you receive will be similar to the following:

   ```
   \ddrive\pictures\HVJ5NXGC0WQ.I5KKB6;psmith.bmp
   ```

   A valid access token is required to read this file on the Data Links server.

   Note: By default, this access token is only valid for 60 seconds. This means that once you enter this command, you have only 60 seconds to complete the remaining steps in this section. You can increase the access token expiry time by updating the *dl_expint* database configuration parameter.

   To change the default expiration time for an access token to 10 minutes (the value is entered in seconds), enter the following commands:

   ```
   db2 update db cfg for staff using dl_expint 600
   db2 terminate
   db2 connect to staff
   ```

   If you change a setting for any database configuration parameter, you must always reconnect to the database for the changes to take effect.

5. Log out.

Now you can view the sample file.

Related tasks:

- "Verifying the sample file is controlled by DLFF (Windows)" on page 30
- "Viewing the sample file (Windows)" on page 33

Related reference:

- "Configuration parameters summary" in the *Administration Guide: Performance*

Viewing the sample file (Windows)

Viewing the sample file is part of the larger task of *Verifying the DB2 Data Links Manager installation on Windows*.

Prerequisites:

Log on to the system using any user account other than the DB2 Data Links Manager Administrator or the DLFM user account.

Procedure:

To view the sample file:

1. Verify that you can access the file that is under the control of the Data Links File Manager.

   For the example, enter the following command:

   ```
   type "\\dlmserver\ddrive\pictures\access_token;psmith.bmp"
   ```

   where *access_token* represents the encrypted key.

   You should receive the following output from this command:

   ```
   "This is a picture of Paul Smith."
   ```

If you did not receive an error, you have access to this file and you have installed and configured DB2 Data Links Manager correctly.

Related tasks:

- "Verifying the sample file is accessible (Windows)" on page 31
- "Applying a FixPak for Data Links Manager on Windows" on page 33

Applying a FixPak for Data Links Manager on Windows

To apply the Data Links Manager FixPak on Windows:

1. As the DB2 Data Links Manager Administrator (dlmadmin), bring down the DB2 Data Links Manager by stopping the DB2 Data Links Manager service:
   a. Select **Start** and select **Settings->Control Panel->Services**.
   b. Right click on the DB2 Data Links Manager service and select **Stop**.

   Ensure that there are no other DB2 processes remaining, by issuing a **db2stop** command for each instance.
2. Install the FixPak.
3. As the DB2 Data Links Manager Administrator, run the following commands to bring up the DB2 Data Links Manager:

   ```
   dlfm bind
   dlfm start
   ```

Alternatively, the **dlfm start** command can be performed through the Windows Services GUI.

Related concepts:

- "Before you install DB2 Data Links Manager (Windows)" on page 13

Related reference:

- "What's new in DB2 Data Links Manager Version 8" on page 1

Chapter 3. Installing Data Links Manager on AIX

Before you install DB2 Data Links Manager (AIX)

Read this information before installing DB2® Data Links Manager. The information is common to installations in JFS environments, including the Tivoli® Space Manager FSM extension to JFS.

Installing DB2 Data Links using the DB2 Setup wizard or SMIT
It is strongly recommended that you use the DB2 Setup wizard if you are installing DB2 Data Links Manager in JFS environments. The DB2 Setup wizard performs almost all Data Links Manager setup and configuration tasks for you. If you want to install DB2 Data Links Manager using SMIT or db2_install, you will have to set up and configure your Data Links Manager system manually.

AIX® 5L Version 5.2 support
The Data Links File Manager (DLFM) and Data Links Filesystem Filter (DLFF) components are now fully supported on AIX 5L™ Version 5.2. All tools and instructions associated with Data Links Manager and previously supported on prior releases of AIX are fully supported and applicable on AIX 5L Version 5.2.

Disk space requirements
Ensure that there is at least 85 MB of free disk space in the `/usr/opt` directory. To check available free disk space, enter the **df -k /usr/opt** command.

Memory requirements
Ensure that there is at least 256 MB of memory available to your system. To check available memory, enter the **lsattr -l sys0 -E -a realmem** command.

Migrating from previous versions
Different levels of DB2 Data Links Manager instances cannot exist on the same machine. If you have a pre-Version 8 Data Links instance on your system, you must migrate the instance to the Version 8.2 format using the **db2imigr** command.

Registry variables offer more function and flexibility than environment variables. However, because of this, it is possible that migration will not be performed exactly as expected. The registry variables can be checked using the **db2set** command after migration.

Data Links server security
In releases prior to DB2 Data Links Version 8, there were no security controls on linking a file. If you migrated from a previous release, you will be given the option at DLFM migration time to enable these security controls on their existing DLFM Server(s).

Migrating from DB2 Data Links Version 6.1, 7.1, 7.2, or Version 8.1 to DB2 Data Links Manager Version 8.2

If you are migrating from DB2 Data Links Manager Version 6.1, 7.1, 7.2, or Version 8.` to DB2 Data Links Manager Version 8.2, you should perform the following steps:

1. Prepare your DB2 and DLFM databases for migration. For example, you can backup your existing databases.
2. Install DB2 Version 8.2 on your DB2 server and Data Links Manager server machines.
3. As DLFM, run the **db2dlmmg** command.

When you migrate to DB2 Data Links Manager Version 8.2, the following environment variables will be converted to DB2 registry variables:

```
DLFM_INSTALL_PATH
DLFM_PORT
   DLFM_BACKUP_DIR_NAME (1)
DLFM_BACKUP_TARGET (2)
DLFM_BACKUP_TARGET_LIBRARY (3)
```

Notes:

1. This variable is used only if a local file system is the backup target.
2. Used to indicate the type of backup target used. Possible values for this variable are LOCAL, TSM, or XBSA.
3. Used to indicate the XBSA support code library only if the DLFM_BACKUP_TARGET is set to XBSA. The support code library must be fully qualified and must include the shared object name, for example `/usr/lpp/Legato/libxdb2.a(bsashr10.o)`. The name of the shared object, in this case `bsashr10.o`, is available from the vendor suppling the XBSA compliant shared library.

TCP/IP port number

You must have a TCP/IP port available for use by the Data Links File Manager. By default, the DB2 Setup wizard will generate a value for you. You can use this value or provide your own. You will need to know this port number to verify the installation.

If you want to specify your own port number, review the TCP/IP ports that are already in use on a machine by opening the `/etc/services` file. You will need to specify this port during the installation.

Once you have selected a TCP/IP port number for use by the DLFM, the value should not be changed.

Synchronize system clocks

Ensure that the system clocks on the Data Links server and the remote DB2 server are synchronized and remain synchronized for linked files in the DATALINKS columns with the READ PERMISSION DB option. Synchronization of clocks is essential for the Data Links token expiry interval to work correctly. The token expiry interval is a database configuration parameter that controls how long a selected DATALINK value (consisting of a URL with an embedded file authorization token) can be used.

To check the system time and date, enter the **date -u** command.

For more information on synchronizing system clocks, refer to your *AIX Administration Guide*.

Registry variable size for DATALINK columns

Any DB2 database using at least one DATALINK column in Version 8 will require an increase in the APP_CTL_HEAP_SZ registry variable to avoid failures in such utilities as Reconcile and Load. The default for APP_CTL_HEAP_SZ is 128 (4KB pages). It is recommended that you

increase this to 256 in a DB2 database using DATALINK column(s). The following command can be used to increase this value as described:

```
db2 update db cfg for <dbname> using APP_CTL_HEAP_SZ 256
```

If you have already increased this value for other reasons, it is recommended that you further increase this value by 128. If you already use 256, the addition of one or more DATALINK columns would mean further increasing this setting to 256+128=384).

Data Links Manager Administrator user ID

During installation, you are given the option to create the owner of the DB2 Data Links instance in the **Set user information for the Data Links installation** panel. These installation instructions assume that you selected this option and now want to replace it with an existing user ID.

If you want to specify your own existing user ID, the account you specify:

- Must *not* have its home directory reside on a file system that is using a Data Links Filesystem Filter.
- Must have a username that is eight characters or less.
- Must *not* be a user ID with `root` authority.

To create a user ID for use as the DB2 Data Links Manager Administrator:

1. Log in as a user ID with root authority.
2. Create the group for the DB2 Data Links Administrator (for example, dlfmgrp):

   ```
   mkgroup dlfmgrp
   ```

3. Create the write group (for example, dlfmxgrp):

   ```
   mkgroup dlfmxgrp
   ```

   When a file is linked to a DATALINK column defined with WRITE PERMISSION ADMIN, the file will be changed to be owned by this group.

   The DLFMXGRP group is created for use with the update in place functionality for any file linked to a DATALINK column defined with WRITE PERMISSION ADMIN. The DLFMGRP group is also created. You should not add any user IDs to these groups; DLFM should be the only user ID to create a file that's owned by the DLFM.

4. Create the username for the DB2 Data Links Administrator (for example, dlfm), using the `/home/dlfm` directory as the home directory of the Data Links Administrator:

   ```
   mkuser pgrp='dlfmgrp' groups='dlfmgrp,dlfmxgrp' home='/home/dlfm' dlfm
   ```

5. Assign a password to this username by entering the **passwd** *user* command, where **user** is the username that you created.

The DB2 Data Links Manager Administrator user ID is not only for the purpose of administrating the Data Links File Manager, but also to own the DLFM_DB and files that are in a linked state. The DB2 Data Links Manager Administrator user ID should never own directories on a file system that is under the control of a Data Links Filesystem Filter (DLFF). The DB2 Data Links Manager Administrator user ID should only be used to administer the Data Links File Manager (DLFM). You can have the DB2 Data Links Manager Administrator user ID as the owner of files, but only READ PERMISSION DB linked files. You should not manually create files with the DB2 Data Links Manager Administrator user ID as the owner.

If you create a different username by changing the default values, you must ensure that the username you specify is eight characters or less.

Determine hostname

You must determine the names of each of your DB2 and Data Links servers. You will need to know these hostnames to verify the installation. When connecting to a Data Links File Manager (DLFM), the DB2 UDB server internally sends the following information to the DLFM:

- Database name
- Instance name
- Hostname

The DLFM then compares this information with its internal tables to determine whether the connection should be allowed. It will allow the connection only if this combination of database name, instance name, and hostname has been registered with it, using the dlfm add_db command. The hostname that is used in the dlfm add_db command must exactly match the hostname that is internally sent by the DB2 UDB server.

Use the exact hostname that is obtained as follows:

1. Enter the **hostname** command on your DB2 server. For example, this command might return *db2server*.
2. Enter the **host** *db2server* command, where *db2server* represents the name obtained in the previous step. This command should return output similar to the following:

```
db2server.services.com is 9.11.302.341,  Aliases:  db2server
```

Use `db2server.services.com` for the hostname when registering a DB2 UDB database using the dlfm add_db command. The DB2 server's internal connections to the DLFM will fail if any other aliases are used in the dlfm add_db command.

A Data Links server is registered to a DB2 database using the DB2 **add datalinks manager for database** *database_alias* **using node** *hostname* **port** *port_number* command.

The hostname is the name of the Data Links server. Any valid alias of the Data Links server can be used in this command. DATALINK values that are references to this Data Links server must specify the hostname in the URL value; that is, the exact name that was used in the **add datalinks manager** command must be used when assigning URL values to DATALINK columns. Using a different alias will cause the SQL statement to fail.

Tivoli Space Manager integration with Data Links

DB2 Data Links Manager allows you to take advantage of the functionality of Tivoli Space Manager. The Tivoli Space Manager Hierarchical Storage Manager (HSM) client program automatically migrates eligible files to secondary storage to maintain specific levels of free space on local file systems. It automatically recalls migrated files when they are accessed, and it permits user IDs to migrate and recall specific files.

The prerequisite for this functionality is Tivoli Space Manager Version 5.1.

This feature benefits customers who have file systems with large files that are required to be moved to secondary storage periodically, and in which the space of the file system needs to be managed on a regular basis. For many customers, Tivoli Space Manager provides the means to manage

their secondary storage. DB2 Data Links Manager's support of Tivoli Space Manager provides flexibility in managing the space for DATALINK files. Rather than pre-allocating enough storage in the DB2 Data Links Manager file system for all files that can be stored there, Tivoli Space Manager allows allocations of the Data Links-managed file system to be adjusted over a period of time without the risk of inadvertently filling up the file system during normal use.

Data Links replication
Data Links Manager Version 8.1 introduced two new registry variables, DLFM_START_ASNCOPYD and DLFM_ASNCOPYD_PORT. During installation, you will be prompted to enable the Data Links Manager Replication daemon. If you plan to use Data Links Replication, you should enable the Replication daemon during the installation. You can also enable it after installation by setting the registry variables (DLFM_START_ASNCOPYD and DLFM_ASNCOPYD_PORT) and restarting the DLFM.

Related concepts:

- "Actions performed by the DB2 Setup wizard (AIX)" on page 45
- "Installation considerations in JFS environments (AIX)" on page 41
- "Introduction to Data Links Manager security" in the *DB2 Data Links Manager Administration Guide and Reference*

Related tasks:

- "Installing DB2 Data Links manually using the db2_install command (AIX)" on page 43
- "Installing DB2 Data Links Manager using the DB2 Setup wizard (AIX)" on page 44
- "Enabling the Data Links Manager Replication daemon" in the *DB2 Data Links Manager Administration Guide and Reference*

Converting an existing DLFM database to the DB2 Version 8.1 format

The DLFM database migration utility, **db2dlmmg**, converts an existing DLFM database from its DB2 Version 6.1, Version 7.1, or Version 7.2 format to the new DB2 Version 8.1 format. The only DB2 database with which this utility should be run is the one that resides on a DLFM server. This database is called DLFM_DB, and by default belongs to the DB2 instance called DLFM, owned by the Data Links Manager Administrator. Each occurrence of this database, one per DLFM server, must be migrated independently using the **db2dlmmg** utility.

The **db2dlmmg** utility is installed in the `INSTHOME/sqllib/adm` directory, where INSTHOME represents the home directory of the Data Links Manager Administrator.

Before running the **db2dlmmg** utility, you must have installed the DB2 Version 8.1 Data Links Manager. You should not attempt to run the **db2dlmmg** utility from prior releases against a DLFM_DB database. You must also already have run the DB2 Instance Migration (**db2imigr**) utility against the DLFM database instance.

The DLFM database migration utility performs the following basic steps:

1. Stops the DLFM if it is running.

2. Requests how you would like your Version 8.1 Data Links Manager linked file security controls set up.
3. Verifies that the current DLFM_DB contents are in a valid pre-Version 8.1 format.
4. Automatically backs up the current DLFM_DB database.
5. Increases the amount of log space reserved for this database.
6. Creates new buffer pools and tablespaces.
7. Creates and alters tables and indexes.
8. Moves the largest DLFM_DB table into one of the new tablespaces.
9. Sets up the linked file security controls as specified in step 2.
10. Rebinds the DLFM executables to the modified database.

If the migration utility detects an error during its processing, it will provide an error message with instructions on how to proceed. In some cases, you will be able to correct the problem and simply re-run **db2dlmmg**. In many cases, however, you will be instructed to *first* restore the original DLFM_DB (backed up in step 4 above), and then re-run **db2dlmmg**. The backup in step 4 is stored in the location specified by the DLFM configuration variables DLFM_BACKUP_TARGET and DLFM_BACKUP_DIR_NAME. To restore the original database, you run the DB2 restore utility as follows:

- `db2start`
- `db2 restore database dlfm_db from <backup-directory>[taken at <date-time>] without rolling forward`

  <backup-directory> represents the fully qualified path specified in DLFM_BACKUP_DIR_NAME, and taken at <date-time> must be specified if there are multiple backup images under <backup-directory>.

To view the values of the configuration variables DLFM_BACKUP_TARGET and DLFM_BACKUP_DIR_NAME, enter the commands:

- `db2set DLFM_BACKUP_TARGET`
- `db2set DLFM_BACKUP_DIR_NAME`

If the value of the DLFM_BACKUP_TARGET variable is either ″TSM″ or ″XBSA″, the required restore command above will be different. Refer to the description of the RESTORE utility for accessing backups in TSM or an XBSA archive server.

To run the DLFM database migration utility, perform the following steps on each DLFM server:

1. Log in to the DLFM server using the Data Links Manager Administrator id.
2. Ensure sufficient free space is available in the filesystem pointed to by the DLFM_BACKUP_DIR_NAME configuration variable. There must be at least enough space for a full backup of the DLFM_DB database. (Allow enough space for at least two DLFM_DB backups. See step 7 below for details.)
3. Ensure sufficient free space for the increased transaction log files in the DLFM instance filesystem. The LOGPRIMARY configuration variable will be increased to 6 (if previously less than 6). The LOGFILSIZ configuration variable will be increased to 2000 (if previously less than 2000). You can view the current settings for these variables by entering the **db2 get db cfg for dlfm_db** command.
4. Ensure sufficient additional free space for work files (used by **db2dlmmg**) in the DLFM instance filesystem. You can use the amount of space currently used by the DLFM_DB as an estimate of this additional amount of space required.

5. Run the migration utility by entering the **db2dlmmg** command.
6. Allow the migration utility to run *uninterrupted* to completion. Depending upon the size of the DLFM_DB, it could run for several minutes or possibly as long as an hour. Progress of the migration will be reported to the screen with various status messages. In the event of an error, follow the instructions documented for the given error messages, and then re-run the **db2dlmmg** command.
7. Once the migration utility completes successfully, you should manually take a full backup of the DLFM_DB for full recoverability of the DLFM server under Version 8.1 (The migration utility does not do this automatically.)

Some important points to note:

- Once you have completed the above procedure, you will be able to perform all Version 8.1 DLFM operations. You should issue the *dlfm start* command to verify that the Version 8.1 Data Links File Manager starts successfully with the new DLFM_DB. To verify that the DLFM is running, you can check for the DLFM processes by using the **dlfm see** command.
- You should also then either follow the installation validation instructions described in the Data Links Manager installation documentation or use your existing Data Links application to verify correct operation of the Data Links Manager.
- Do *not* attempt to restore *any* backups of the DLFM_DB from prior to the migration. The pre-Version 8.1 backups are no longer usable with the Version 8.1 Data Links Manager.
- If you have problems with the migration, you should contact IBM Service. *Never* attempt to manually update the contents of the DLFM_DB except with the assistance of IBM Service.

Related concepts:

- "Before you install DB2 Data Links Manager (AIX)" on page 35
- "Installation considerations in JFS environments (AIX)" on page 41

Installation considerations in JFS environments (AIX)

If you plan to deploy DB2® Data Links Manager in a Journaled File System (JFS) environment, you should also take the following information into consideration:

Operating system level
Ensure that you are running AIX® Version 4.3.3 or later. To check the level of the operating system, enter the **oslevel** command.

Version levels of DB2 Data Links and DB2 Universal Database™
DB2 Universal Database and DB2 Data Links Manager can be any combination of Version 6.1, 7.1, 7.2, and 8.1. For example, DB2 can be at Version 6.1 and Data Links Manager can be at Version 8.1. To check the version of DB2 that resides on a workstation, enter the **db2level** command.

If DB2 is at the higher version, such as Version 8.1, the Data Links Manager features introduced in Version 8.1 will not be available when you connect to a Data Links Manager at Version 6 or 7. You will receive an SQL error if you attempt to use the Version 8 features.

Disk space requirements for DB2 Data Links Manager Administrator
Ensure that there is at least 70 MB of free disk space in the home directory where the DB2 Data Links Manager Administrator's home directory will

reside. To check available free disk space, enter the **df -k** *INSTHOME* command, where *INSTHOME* represents the home directory of the DB2 Data Links Manager Administrator user ID.

Related concepts:

- "Before you install DB2 Data Links Manager (AIX)" on page 35

Related tasks:

- "Installing DB2 Data Links manually using the db2_install command (AIX)" on page 43
- "Installing DB2 Data Links Manager using the DB2 Setup wizard (AIX)" on page 44

Tivoli Space Manager Hierarchical Storage Manager (AIX)

Adding both Data Links and HSM support to a file system

When registering a file system with Hierarchical Storage Management (HSM), register it with HSM *first* and then with the Data Links File Manager.

1. Ensure that the file system is already mounted as JFS.
2. Register with HSM, using the command **dsmmigfs add /fs**.
3. Register with DLM, using the command **dlfmfsmd /fs**.

Data Links support for a file system is reflected in the stanza in `/etc/filesystems` for an HSM file system via the following entries:

```
vfs = dlfs
mount = false
options = rw,Basefs=fsm
nodename = -
```

Adding Data Links support to an existing HSM file system

Register with DLM, using the command **dlfmfsmd /fs**.

Adding HSM support to an existing Data Links file system

1. Data Links support, using the command **dlfmfsmd -j /fs**.
2. Register with HSM, using the command **dsmmigfs add /fs**.
3. Register with DLM, using the command **dlfmfsmd /fs**.

Removing Data Links support from a Data Links-HSM file system

Remove Data Links support, using the command **dlfmfsmd -j /fs**.

Removing HSM support from a Data Links-HSM file system

1. Remove HSM support, using the command **dsmmigfs remove /fs**.
2. Remove Data Links support, **dlfmfsmd -j /fs**.
3. Register with DLM, using the command **dlfmfsmd /fs**.

Removing both Data Links and HSM support from a Data Links-HSM file system

1. Remove HSM support, using the command **dsmmigfs remove /fs**.
2. Remove Data Links support, using the command **dlfmfsmd -j /fs**.

Restrictions and limitations

- This functionality is currently supported on AIX® only.
- Selective migration (dsmmigrate) and recall of a READ PERMISSION DB linked file should only be done by a user ID with root authority.

Selective migration can be performed only by the file owner which in the case of READ PERMISSION DB files is the Data Links Manager Administrator (dlfm, by default).

To access such files a token is required from the host database side. The only user ID who does not require a token is the root user ID. It will be easier for a root user ID to perform the selective migrate and recall on READ PERMISSION DB files. The dlfm user ID can migrate a READ PERMISSION DB file using a valid token only the first time.

The second time migration is attempted (after a recall), the operation will fail with error message ″ANS1028S Internal program error. Please see your service representative.″ Running **dsmmigrate** on a READ PERMISSION DB file by a non-root user ID will not succeed. This limitation is minor as it is typically the administrators who will access the files on the file server.

- stat and statfs system calls will show VFS-type as fsm rather than dlfs, although dlfs is mounted over fsm. The above behavior is for the normal functionality of **dsmrecalld** daemons, which performs statfs on the file system to check if its VFS-type is fsm or not. You can also use the **lsfs** command to view the filesystem
- Command ″dsmls″ does not show any output if a file having the minimum inode number is READ PERMISSION DB linked. The **dsmls** command is similar to the **ls** command and lists the files being administered by TSM. No user action is required.

Related concepts:

- “Before you install DB2 Data Links Manager (AIX)” on page 35

Related reference:

- “Tivoli Storage Manager” in the *Data Recovery and High Availability Guide and Reference*

Installing DB2 Data Links manually using the db2_install command (AIX)

The DB2 Setup wizard is the recommended method for installing all DB2 products on UNIX-based operating systems. This wizard can perform all of the tasks required to install DB2 Data Links Manager. However, if you want more control of the installation process, you can manually install DB2 Data Links Manager using the **db2_install** command.

Prerequisites:

Log in as a user ID with root authority.

Procedure:

To install DB2 Data Links Manager for AIX using the **db2_install** command:

1. Insert and mount the appropriate CD-ROM.

   Note: If you are mounting the CD-ROM drive from a remote system using NFS, the CD-ROM file system on the remote machine must be exported with root access. You must also mount that file system with root access on the local machine.

2. Run the **db2_install** command from the directory where the CD-ROM is mounted.

   The **db2_install** command prompts for the following to be installed, and for the base directory where the product files are to be installed:

   DB2.DLM
   DB2 Data Links Manager for AIX

   The command displays the following prompt: `Specify one or more of the keywords separated by spaces.`
3. Type the keyword of the product to be installed when prompted.
4. The files will be installed in the `/usr/opt/db2_08_01/` directory.
5. Enter `Yes` to start the product installation.

If you want your DB2 product to have access to DB2 documentation either on your local computer or on another computer on your network, then you must install the DB2 Information Center. The DB2 Information Center contains documentation for DB2 Universal Database and DB2 related products.

Related concepts:

- "Actions performed by the DB2 Setup wizard (AIX)" on page 45
- "Before you install DB2 Data Links Manager (AIX)" on page 35
- "DB2 Information Center" on page 92
- "DB2 Information Center installation scenarios" on page 93

Related tasks:

- "Verifying the installation of DB2 Data Links Manager (AIX)" on page 50
- "Installing DB2 Data Links Manager using the DB2 Setup wizard (AIX)" on page 44
- "Manual post-installation tasks (AIX)" on page 48
- "Installing the DB2 Information Center using the DB2 Setup wizard (UNIX)" on page 95

Installing DB2 Data Links Manager using the DB2 Setup wizard (AIX)

The DB2 Setup wizard is the recommended method for installing all DB2 products on UNIX-based operating systems. This utility can perform all of the tasks required to install DB2 Data Links Manager. However, if you want more control of the install process, you can manually install DB2 Data Links Manager using the **db2_install** command.

Prerequisites:

Log in as a user ID with root authority.

Procedure:

To install and configure DB2 Data Links Manager using the DB2 Setup wizard:

1. Insert and mount your product CD-ROM.
2. Change to the directory where the CD-ROM is mounted by entering the **cd /cdrom** command where **cdrom** is the mount point of your product CD-ROM.
3. Ensure that your X display works.
4. Enter the **./db2setup** command. The Launchpad opens.

5. Select **Install Products**.
6. Select the product you want to and are licensed to install. Click **Next**.
7. Follow the on-screen instructions to begin the installation process.

   The DB2 Setup wizard automatically generates an installation log in `/tmp/db2setup.log`. If you want to generate a trace file to record any installation errors in greater detail, enter the**./db2setup -t /tmp/trace.out** command. This generates a trace file in `/tmp/trace.out`.

If you want your DB2 product to have access to DB2 documentation either on your local computer or on another computer on your network, then you must install the DB2 Information Center. The DB2 Information Center contains documentation for DB2 Universal Database and DB2 related products.

Related concepts:

- "Actions performed by the DB2 Setup wizard (AIX)" on page 45
- "Before you install DB2 Data Links Manager (AIX)" on page 35
- "DB2 Information Center" on page 92
- "DB2 Information Center installation scenarios" on page 93

Related tasks:

- "Verifying the installation of DB2 Data Links Manager (AIX)" on page 50
- "Installing DB2 Data Links manually using the db2_install command (AIX)" on page 43
- "Installing the DB2 Information Center using the DB2 Setup wizard (UNIX)" on page 95

Actions performed by the DB2 Setup wizard (AIX)

After installation is complete and before you exit the DB2® Setup wizard, you can select **View Log** to review the installation process. You can also review the `/tmp/db2setup.log` file for more detailed information. If you ran the **./db2setup -t /tmp/trace.out** command to capture any installation errors, you can review the trace log in `/tmp/trace.out`.

The following actions are performed by the DB2 Setup wizard:

Installation directory
DB2 Data Links Manager and DB2 Universal Database™ are installed in the `/usr/opt/db2_08_01` directory. DB2 Data Links Manager uses DB2 UDB to maintain logged information for the linked files.

Group and user IDs
A group ID (gid) and user ID (uid) are created for the DB2 Data Links Manager Administrator, if you selected to do so during installation.

Instance creation
An instance for the Data Link File Manager is created. The name of the instance is the same as the user name for the instance owning user. By default a new user named `dlfm` will be created to use as the instance-owning user for the Data Links instance.

Registry variables
The following registry variables are set (only the most significant variables set during install are listed here):

```
DLFM_PORT=port_number
   DB2_HASH_JOIN=ON
DLFM_INSTALL_PATH=/home/instance/sqllib/bin
   //where instance is the Data Links Administrator ID
DLFM_INSTANCE_NAME=instance_name
DB2INSTANCE=instance_name
DLFM_BACKUP_DIR_NAME=$HOME/dlfmbackup
DLFM_BACKUP_TARGET=LOCAL
   //You have three choices: LOCAL, TSM, and XBSA
DLFM_FS_ENVIRONMENT=file_system
DLFM_START_ASNCOPYD=NO  //or YES if you enable
   the Data Links Manager Replication Daemon
DLFM_ASNCOPYD_PORT=port_number //specified during the install
DLFM_NUM_ARCHIVE_SUBSYSTEMS=2
```

where:

- *port_number* represents the port number reserved for the Data Links File Manager.
- *instance_name* represents the name of the Data Links File Manager instance.
- *file_system* represents NATIVE in JFS environments. The default setting is NATIVE.

You can use the **db2set –all** command to view all of the set variables.

DLFM_AUTOSTART registry variable

With Data Links Manager, the installer has an option to request that the DLFM be started on any reboot of the machine on which Data Links Manager is installed. After installing Data Links Manger, the reboot will automatically load the DLFF and mount all defined DLFS file systems. However, the startup of the DLFM is optional.

If this option is selected during the installation, then the DB2 registry variable DLFM_AUTOSTART is set to "YES". Upon reboot, the **dlfm start** command will be issued (by means of an entry in the `/etc/inittab` file).

If this option is *not* selected during install, then the DB2 registry variable "DLFM_AUTOSTART" is set to "NO". Upon reboot, no **dlfm start** command will be issued.

If after installation, you want to alter this behavior, you need to simply change the value of the DLFM_AUTOSTART DB2 registry variable using the **db2set** command. For example, `db2set DLFM_AUTOSTART=YES`. The effect of this change will be seen upon reboot of the system. If the variable is not set at all, its default value is "NO".

PATH variables

The following variables are set in the DB2 Data Links Manager Administrator's `db2profile` or `db2cshrc` script file:

```
(for bash, Bourne, or Korn shell)
export PATH=$PATH:$HOME/sqllib/bin:$HOME/sqllib/adm:$HOME/sqllib/misc
(for C shell)
setenv PATH=${PATH}:${HOME}/sqllib/bin:${HOME}/sqllib/adm:${HOME}/sqllib/misc
```

To run the DB2 Data Links Manager Administrator's `db2profile` or `db2cshrc` script file each time this user ID logs on to the system, add the following entry to the DB2 Data Links Manager Administrator's .profile script file:

```
. INSTHOME/sqllib/db2profile (for bash, Bourne, or Korn shell)
source INSTHOME/sqllib db2cshrc (for C shell)
```

where *INSTHOME* represents the home directory of the DB2 Data Links Manager Administrator.

Virtual File System number
In JFS environments, the following entry is added to the `/etc/vfs` file:

```
dlfs  12  /usr/opt/db2_08_01/bin/dlfs_mnthlp /usr/opt/db2_08_01/bin/dlfs_fshelper
```

If the vfs number *12* is already in use, the DB2 Setup wizard will specify a different number between *8-15* for use by the Virtual File System (VFS).

DB2 database DLFM_DB created
A DLFM_DB database is created on the node containing DB2 Data Links Manager.

Related concepts:

- "Before you install DB2 Data Links Manager (AIX)" on page 35

Related tasks:

- "Installing DB2 Data Links manually using the db2_install command (AIX)" on page 43
- "Installing DB2 Data Links Manager using the DB2 Setup wizard (AIX)" on page 44

Verifying the DLFM_DB was successfully created and catalogued (AIX)

Once the DB2 Setup wizard has finished installing DB2 Data Links Manager on your system, you should ensure that it successfully created and catalogued the DLFM_DB database by listing the contents of the System Database Directory. Once you have verified that this database exists, you need to set up a backup and recovery scheme to aid in data recovery and to protect the data integrity.

Procedure:

To verify that the DLFM_DB database was successfully created and catalogued:

1. Run the **db2profile** or **db2cshrc** script as follows:

   ```
   . INSTHOME/sqllib/db2profile    (for bash, Bourne or Korn shell)
   source INSTHOME/sqllib/db2cshrc (for C shell)
   ```

   where *INSTHOME* represents the home directory of the instance owner.
2. Retrieve the entry for the DLFM_DB database in the System Database Directory:

   ```
   db2 list database directory
   ```

   This command returns output similar to the following:

   ```
   System Database Directory

   Number of entries in the directory = 1

   Database 1 entry:

   Database alias                  = DLFM_DB
   Database name                   = DLFM_DB
   Local database directory        = /home/dlfm
   ```

```
Database release level          = 9.00
Comment                         =
Directory entry type            = Indirect (1)
Catalog node number             = 0
```

On DLFM client nodes, this command returns output similar to the above example except that Directory entry type is Remote.

Related concepts:

- "Space requirements for log files" in the *Administration Guide: Planning*

Related tasks:

- "Manual post-installation tasks (AIX)" on page 48

Manual post-installation tasks (AIX)

After manually installing Data Links Manager, you must perform several additional configuration tasks.

Restrictions:

Unless otherwise noted, these tasks apply to Data Links Manager installations in native JFS.

Prerequisites:

A user ID with root authority on the DLFM server

Procedure:

To complete your manual DB2 Data Links Manager installation:

For JFS:

1. Run the **/usr/opt/db2_08_01/instance/dlfmcrt** command to create a DLFM instance.
2. Set the DLFM_PORT registry variable to an unused port number by entering the following command:

   ```
   db2set DLFM_PORT=port_number
   ```

   where *port_number* is any unused communications port number. It is recommended that you add this entry to your `/etc/services` file so that no other services use this port.
3. Use the **dlfmfsmd** command to convert your JFS or TSM partition to DLFS.

To run the DB2 Data Links Manager Administrator's `db2profile` or `db2cshrc` script file each time this user ID logs on to the system, add the following entry to the DB2 Data Links Manager Administrator's *.profile* script file:

```
. INSTHOME/sqllib/db2profile (for bash, Bourne, or Korn shell)
source INSTHOME/sqllib db2cshrc (for C shell)
```

where *INSTHOME* represents the home directory of the DB2 Data Links Manager Administrator.

When you install DB2 Data Links File Manager using the software bundle feature, the DB2 Product Library (HTML) filesets are not installed automatically. Also, the DB2 Product Messages, other than in English, are not installed. You must install these filesets separately.

Related concepts:

- "Workarounds in NFS environments (AIX)" on page 49

Related tasks:

- "Installing DB2 Data Links manually using the db2_install command (AIX)" on page 43

Workarounds in NFS environments (AIX)

This topic describes workarounds to known problems when running DB2® Data Links Manager for AIX® in NFS environments. These problems are NFS-specific and have nothing to do with DB2 Data Links Manager or DB2 Universal Database™.

Additional NFS caching issues

Two different caches are maintained on the NFS client for AIX. The NFS client maintains a cache with attributes of recently accessed files and directories. The client also optionally supports a data cache for caching the content of files on the client.

The attribute caching process sometimes produces an unusual condition on an NFS client after a READ PERMISSION DB file is linked. User IDs are sometimes able to access a READ PERMISSION DB file without an access control token if these user IDs are connected to the machine before the file was linked. Use one of these methods to reduce the likelihood of unauthorized file access:

- Use the **touch** command on the file before executing the SQL **INSERT** statement to set the link.
- Use the **touch** command on the directory containing the file.
- Use the **mount** command with one of the five attribute cache configuration parameters (`actimeo`, `acregmin`, `acregmax`, `acdirmin`, `acdirmax`) to minimize the time that cached attributes are retained after a file or a directory is modified.

You are most likely to observe unauthorized access of READ PERMISSION DB files during Data Links function testing since only one file is linked and there is little NFS activity. You are less likely to encounter this scenario in a production environment since NFS activity is heavy and the NFS attribute cache usually does not retain the attributes for all linked files.

Related concepts:

- "Before you install DB2 Data Links Manager (AIX)" on page 35

Related tasks:

- "Verifying the installation of DB2 Data Links Manager (AIX)" on page 50

Creating a keytab file (AIX)

DLFM daemons must become DCE network root to access the DFS™ filesets. To be able to do this the DCE network root has to create a DCE keytab file so that the daemons can take on network root privileges and refresh their credentials periodically.

This keytab file, which contains the principal and password information, should be called datalink.ktb and should be stored under the $INSTHOME/sqllib/security/ directory, where $INSTHOME represents the home directory of the Data Links Manager Administrator. This file should have its permissions set to read only by the local root user ID and should be created on the DLFM server node and all DLFM client nodes.

Prerequisites:

A user ID with root authority.

Procedure:

To create a keytab file:

1. Enter the **rgy_edit** command. A rgy_edit prompt similar to the following should appear:

   ```
   rgy_edit==>
   ```

2. Enter the **kta** command as follows:

   ```
   kta[dd] -p principal [-r[egistry]][-a | -pw password][-f keyfile]
   ```

   For example, you might enter a command similar to the following:

   ```
   kta -p root -f /u/dlfm/sqllib/security/datalink.ktb
   ```

   If you enter the **kta** command without the -pw *password* option, you will be prompted to enter a password.

Related tasks:

- "Manual post-installation tasks (AIX)" on page 48

Verifying the installation of DB2 Data Links Manager (AIX)

This topic describes how to verify your installation on AIX by configuring a DB2 Data Links Manager environment to control files that are linked to DATALINK columns on a DB2 Universal Database server.

Procedure:

To verify the installation of Data Links Manager on AIX:

1. Create a test environment on the DB2 server.
2. Create a test environment on the DB2 Data Links server.
3. Register the Data Links Server with the DB2 database.
4. Verify the sample file is controlled by DLFF.
5. Verify the sample file is accessible.
6. View the sample file.

Related concepts:

- "Before you install DB2 Data Links Manager (AIX)" on page 35

Related tasks:

- "Creating a test environment on the DB2 server (AIX)" on page 51
- "Creating a test environment on the DB2 Data Links server (AIX)" on page 52
- "Registering the Data Links server with the DB2 database (Windows)" on page 29
- "Verifying the sample file is controlled by DLFF (AIX)" on page 59
- "Verifying the sample file is accessible (AIX)" on page 59
- "Viewing the sample file (AIX)" on page 61
- "Installing DB2 Data Links manually using the db2_install command (AIX)" on page 43
- "Installing DB2 Data Links Manager using the DB2 Setup wizard (AIX)" on page 44

Installation verification tasks

Creating a test environment on the DB2 server (AIX)

Creating a test environment on the DB2 server is part of the larger task of *Verifying the installation of DB2 Data Links Manager.*

Prerequisites:

- A user ID with root authority
- A valid DB2 user ID that has System Administrative (SYSADM) authority on the `VALIDATE` instance that you created. By default, any user ID that belongs to the primary group of the instance owner has SYSADM authority on an instance.

Procedure:

To create a test environment on the DB2 UDB server:

1. Log on to the system as a user ID with root authority.
2. Create an instance on the DB2 server using the **db2icrt** command. This instance will contain a database in which tables containing columns of the DATALINK data type will reside.

   In the example, create an instance called `VALIDATE` by entering the following commands:

   ```
   mkgroup testers
   mkuser pgrp='testers' groups='testers' home='/home/validate' validate
      /usr/opt/db2_08_01/instance/db2icrt -u validate validate
   ```
3. Log out.
4. Log on to the system with a valid DB2 user ID that has System Administrative (SYSADM) authority on the `VALIDATE` instance that you created. By default, any user ID that belongs to the primary group of the instance owner has SYSADM authority on an instance.
5. Ensure that the `VALIDATE` instance is the current instance by entering the following command:

   ```
   db2 get instance
   ```

   This command should return the following output:

```
The current database manager instance is:  VALIDATE
```

If you do not receive this output, enter the following commands:

```
set DB2INSTANCE=VALIDATE
db2 get instance
```

6. Set the DATALINKS database manager configuration parameter to *YES* in the VALIDATE instance's configuration file by entering the following command:

   ```
   db2 update dbm cfg using datalinks yes
   ```

   To disable DB2 Data Links Manager functionality on your DB2 server, you would set the DATALINKS database manager configuration parameter to *no*.

7. Start the VALIDATE instance by entering the **db2start** command.

   Note: If you change a setting in an instance's database manager configuration file, you must ensure that you stop and restart the instance (using the **db2stop** and **db2start** commands) for the changes to take effect. In the example, the VALIDATE instance is not started, so only issue the **db2start** command.

8. Create a database using the **db2 create database** command. This database will contain a table using the DATALINK data type.

   For the example, create a database called STAFF by entering the following command:

   ```
   db2 create database staff
   ```

9. Connect to the STAFF database by entering the following command:

   ```
   db2 connect to staff
   ```

10. Create a table called EMPLOYEE, in the STAFF database that you just created, that has a column defined with a DATALINK data type by entering the following command:

    ```
    db2 "create table employee (id int, fname varchar(30),
     lname varchar(30), picture datalink linktype url
     file link control integrity all read permission
     db write permission blocked recovery yes on unlink
     restore)"
    ```

11. Terminate all connections to this database by entering the following command:

    ```
    db2 connect reset
    ```

12. Log out.

Now you can create a test environment on the DB2 Data Links server.

Related tasks:

- "UNIX details when creating instances" in the *Administration Guide: Implementation*
- "Creating a test environment on the DB2 Data Links server (AIX)" on page 52

Related reference:

- "CREATE DATABASE Command" in the *Command Reference*
- "db2icrt - Create Instance Command" in the *Command Reference*

Creating a test environment on the DB2 Data Links server (AIX)

After creating a test environment on the DB2 UDB server, create a test environment on the DB2 Data Links server.

Procedure:

To create a test environment on the DB2 Data Links server:

1. Prepare your file system for Data Links Manager
2. Register the file system with the Data Links Filesystem Filter
3. Register the DB2 databaseRegister the DB2 database
4. Authorize a DB2 user ID to link a file
5. Create a sample file for DB2 Data Links Manager

Related tasks:

- "Preparing your file system for DB2 Data Links Manager (AIX)" on page 53
- "Registering the file system with the Data Links Filesystem Filter (AIX)" on page 54
- "Registering the DB2 database with the Data Links File Manager (AIX)" on page 55
- "Authorizing a DB2 user ID to link a file (AIX)" on page 56
- "Creating a sample file for DB2 Data Links Manager (AIX)" on page 57
- "Creating a test environment on the DB2 server (AIX)" on page 51

Preparing your file system for DB2 Data Links Manager (AIX)

Preparing your file system for DB2 Data Links Manager is part of the larger task of *Creating a test environment on the DB2 Data Links server*. Preparing your file system involves creating a Journaled File System (JFS) and modifying its properties so that it comes under the control of the Data Links Filesystem Filter (DLFF).

Prerequisites:

A user with root authority.

Procedure:

To create a JFS on the Data Links server:

1. Log in as a user with root authority.
2. Prepare a JFS to use a Data Links Filesystem Filter (DLFF).

   Create a Journaled File System (JFS) using the **smit manfs** command and set the **Mount AUTOMATICALLY at system restart?** option to *no*. You can also use an existing JFS file system.
3. Modify the properties of a file system so that it comes under the control of the DLFF, and mount it by entering the following command:

   ```
   /usr/opt/db2_08_01/instance/dlfmfsmd dlfm_mountpoint
   ```

   where *dlfm_mountpoint* represents the mount point of the JFS file system you are using.

   To continue with the example, enter the following command:

   ```
   /usr/opt/db2_08_01/instance/dlfmfsmd /test
   ```
4. Log out.

For more information, refer to your AIX Administration Guide.

Now you can register the file system with the Data Links Filesystem Filter.

Related tasks:

- "Registering the file system with the Data Links Filesystem Filter (AIX)" on page 54

Related reference:

- "dlfm add_prefix command" in the *DB2 Data Links Manager Administration Guide and Reference*

Registering the file system with the Data Links Filesystem Filter (AIX)

Registering the file system with the Data Links Filesystem Filter is part of the larger task of *Creating a test environment on the DB2 Data Links server*.

Prerequisites:

Log on to the system as the DB2 Data Links Manager Administrator.

Procedure:

To register the `/test` file system with the DLFF:

1. Run the `db2profile` or `db2cshrc` script as follows:

   ```
   . INSTHOME/sqllib/db2profile    (for bash, Bourne or Korn shell)
   source INSTHOME/sqllib/db2cshrc (for C shell)
   ```

   where *INSTHOME* represents the home directory of the instance owner.
2. Start the Data Links File Manager by entering the **dlfm start** command.
3. Ensure that the Data Links File Manager started successfully by entering the **dlfm see** command.

   If the Data Links File Manager back-end processes started successfully and are running, you will receive output similar to the following:

   ```
   PID      PPID     PGID      RUNAME   UNAME   ETIME DAEMON NAME
   71326    185894   119252     root     dlfm   00:07 dlfm_gcd_(dlfm)
   75788    185894   119252     root     dlfm   00:07 dlfm_delgrpd_(dlfm)
   100280   185894   119252     root     dlfm   00:07 dlfm_cmgrd_(dlfm)
   154834   234604   119252     root     dlfm   00:05 dlfm_ar_ag_(dlfm)
   185894        1   119252     root     dlfm   00:08 dlfm_wd_(dlfm)
   210534   234604   119252     root     dlfm   00:05 dlfm_ar_ag_(dlfm)
   226860   185894   119252     root     dlfm   00:07 dlfm_upcalld_(dlfm)
   234604   185894   119252     root     dlfm   00:07 dlfm_archived_(dlfm)
   250654   185894   119252     root     dlfm   00:07 dlfm_mon_wd_(dlfm)
   ```
4. To ensure that you successfully mounted and configured the file system that is under the control of a DLFF:
   a. Enter the **lsfs -v dlfs** command to list the defined DLFS file systems.

      For the example, this command returns output similar to the following:

      ```
      Name            Nodename   Mount Pt   VFS   Size  Options
      /dev/dllv       -          /test      dlfs  --    rw,Basefs=jfs
      /dev/lv04       -          /dlinks2   dlfs  --    rw,Basefs=jfs
      ```

   b. Enter the following command to list the DLFS file systems for which the DLFF is loaded:

      ```
      /etc/mount -v vfs | awk '$3 == "dlfs"'
      ```

      This command returns output similar to the following:

      ```
      node      mounted        mounted over    vfs       date        options
      -------- ---------------  --------------- ------ ------------ ---------------
               /dev/dllv        /test           dlfs   Jan 08 16:23 rw,log=/dev/loglv00
               /dev/lv04        /dlinks2        dlfs   Jan 08 16:23 rw,log=/dev/loglv00
      ```

5. Register a file system that is under the control of a Data Links Filesystem Filter by entering the following command:

   ```
   dlfm add_prefix prefix_path
   ```

   where *prefix_path* represents the location of the file system that is under the control of a DLFF.

   For example, register the Data Links server to use the Data Links Filesystem Filter on the `test` file system by entering the following command:

   ```
   dlfm add_prefix /test
   ```

Now you can register the DB2 database.

Related tasks:

- "Registering the DB2 database with the Data Links File Manager (AIX)" on page 55

Related reference:

- "dlfm add_prefix command" in the *DB2 Data Links Manager Administration Guide and Reference*

Registering the DB2 database with the Data Links File Manager (AIX)

Registering the DB2 database with the Data Links File Manager is part of the larger task of *Creating a test environment on the DB2 Data Links server*.

Prerequisites:

Log on to the system as the DB2 Data Links Manager Administrator.

Procedure:

To register a new database with the Data Links File Manager:

1. Register the remote DB2 UDB database where the DATALINK type column was defined by entering the following command:

   ```
   dlfm add_db database instance hostname
   ```

   where:

   - *database* represents the database alias name of the remote database.
   - *instance* represents the instance where *database* resides. If you are registering a Windows instance on an AIX Data Links Manager, *instance* must be in uppercase.
   - *hostname* represents the hostname of the DB2 UDB server where *database* resides.

   The following command will register a database called `STAFF`, which resides in the `VALIDATE` instance on a DB2 UDB server with a hostname of `db2server.services.com`:

   ```
   dlfm add_db staff validate db2server.services.com
   ```

   Do not specify the `DLFM_DB` when you run this command. The DLFM_DB is a local database that is used to keep track of files that are under the control of the Data Links File Manager.

   To list the registered database, enter the following command:

   ```
   dlfm list registered databases
   ```

2. Log out.

Now you can authorize a DB2 user ID to link a file.

Related tasks:

- "Authorizing a DB2 user ID to link a file (AIX)" on page 56

Related reference:

- "dlfm add_db command" in the *DB2 Data Links Manager Administration Guide and Reference*
- "dlfm list registered databases command" in the *DB2 Data Links Manager Administration Guide and Reference*

Authorizing a DB2 user ID to link a file (AIX)

You can authorize a DB2 user ID to link a file. *Authorizing a DB2 user ID to link a file* is part of the larger task of *Creating a test environment on the DB2 Data Links server*.

Prerequisites:

Log on to the system as the DB2 Data Links Manager Administrator.

Procedure:

To authorize a DB2 user ID to link a file in the example */test/pictures* directory:

1. Run:

```
dlfm grant link privilege on dir /test/pictures/ to
   user db2-username for db staff inst validate
   node db2server.services.com
```

   where *db2-username* must be the user ID with which you log on when you perform the link operation (for example, using the SQL INSERT statement) on DB2.

2. To verify that your **dlfm grant** command was correctly specified:

```
dlfm list registered users for directory /test/pictures/ on
   db staff inst validate node db2server.services.com
```

   This command should return the *db2-username* that was specified above.

3. Log out.

By default, link security controls are set to ENABLED during the installation. Use the **dlfm set link security off** command to disable this feature and the **dlfm set link security on** command to re-enable it.

Your next step is to create a sample file.

Related tasks:

- "Creating a sample file for DB2 Data Links Manager (AIX)" on page 57

Related reference:

- "dlfm grant command" in the *DB2 Data Links Manager Administration Guide and Reference*

- "dlfm set link security command" in the *DB2 Data Links Manager Administration Guide and Reference*

Creating a sample file for DB2 Data Links Manager (AIX)

Creating a sample file for DB2 Data Links Manager is part of the larger task of *Creating a test environment on the DB2 Data Links server*.

Prerequisites:

- Log on to the system with any user ID that is *not* a DB2 Data Links Manager Administrator.
- Ensure that the Data Links File Manager (DLFM) is running.

Procedure:

To create a sample file:

1. Create a directory on the file system that is under the control of a Data Links Filesystem Filter (DLFF), to store files to be controlled by a DB2 server, by entering the following command:

   ```
   mkdir filesystem_name/directory_name
   ```

   where:

   - *filesystem_name* represents the name of the file system that is under the control of a DLFF.
   - *directory_name* represents the name of the directory that you want to create.

   The DB2 Data Links Manager Administrator should never be the owner of any files or directories which are in a file system under the control of a Data Links Filesystem Filter. For example, the following command will create the directory called `pictures` on the file system `/test`:

   ```
   mkdir /test/pictures
   ```

2. Change the permissions for the `pictures` directory that you just created so that any user ID can create a file in it by entering the following command:

   ```
   chmod 777 /test/pictures
   ```

3. Create a file called `psmith.bmp` in the `/test/pictures` directory, to be managed by the Data Links File Manager, by entering the following command:

   ```
   echo "This is a picture of Paul Smith." > /test/pictures/psmith.bmp
   ```

4. Log out.

The sample file `psmith.bmp` is a text file, not a bitmap as the `.bmp` extension implies. For the purpose of verifying your installation, this file represents an employee's picture that will be inserted into a table that was defined with the DATALINKS data type.

Now you can register the Data Links server with the DB2 database.

Related tasks:

- "Registering the Data Links Server with the DB2 database (AIX)" on page 57
- "Authorizing a DB2 user ID to link a file (AIX)" on page 56

Registering the Data Links Server with the DB2 database (AIX)

Registering the Data Links Server with the DB2 database is part of the larger task of *Verifying the installation of DB2 Data Links Manager*.

Prerequisites:

Log on to the DB2 server with a valid DB2 user ID that has System Administrative (SYSADM) authority on the VALIDATE instance that you created. By default, any user ID that belongs to the *Local Administrators* group has SYSADM authority on an instance.

Procedure:

To register the Data Links server with the remote DB2 UDB database where the DATALINK type column was defined earlier:

1. Enter the following command:

   ```
   db2 get instance
   ```

   This command should return the following output:

   ```
   The current database manager instance is:  VALIDATE
   ```

   If you do not receive this output, enter the following commands:

   ```
   set DB2INSTANCE=VALIDATE
   db2 get instance
   ```

2. Start the VALIDATE instance by entering the **db2start** command.
3. Register a Data Links server that will control the files that are linked by a DATALINK type column by entering the following command:

   ```
   db2 "add datalinks manager for database database_alias
      using node hostname port port_number"
   ```

   where:

   - *database_alias* represents the database alias name of the database.
   - *hostname* represents the fully qualified hostname of the Data Links server.
   - *port_number* represents the port number that you have reserved for communications between the Data Links server and the DB2 server. You specified this port number during the installation of DB2 Data Links Manager.

   For the example, enter the following command:

   ```
   db2 "add datalinks manager for database staff using node dlmserver.services.com port 50100"
   ```

4. Connect to the STAFF database by entering the following command:

   ```
   db2 connect to staff
   ```

5. Insert an entry into the EMPLOYEE table that you created by entering the following command:

   ```
   db2 "insert into employee values (001,'Paul','Smith',
      dlvalue('http://file_location/controlled_file'))"
   ```

   where:

   - *file_location* represents the fully qualified location of the file that is under the control of a Data Links Filesystem Filter on the Data Links server.
   - *controlled_file* represents the filename of the file that you want to control on the Data Links server.

   For the example, enter the following command

   ```
   db2 "insert into employee values (001,'Paul','Smith',
      dlvalue('http://dlmserver.services.com/test/pictures/psmith.bmp'))"
   ```

6. Log out.

Now you can verify the sample file is controlled by the DLFF.

Related tasks:

- "Verifying the sample file is controlled by DLFF (AIX)" on page 59
- "Creating a sample file for DB2 Data Links Manager (AIX)" on page 57

Verifying the sample file is controlled by DLFF (AIX)

Verifying the sample file is controlled by DLFF is part of the larger task of *Verifying the installation of DB2 Data Links Manager*.

Prerequisites:

Log on to the system as any user ID *except* as a user ID with `root` authority or as the DB2 Data Links Manager Administrator.

Procedure:

To verify that the `psmith.bmp` sample file created earlier is under the control of the Data Links File Filter:

1. Verify that the `psmith.bmp` file is now controlled by the Data Links File Manager by entering the following command:

   ```
   cat controlled_file
   ```

   where *controlled_file* represents the full pathname of the file that is controlled by the Data Links server.

   For the example, enter the following command:

   ```
   cat /test/pictures/psmith.bmp
   ```

   We are using the **cat** command here because `psmith.bmp` is really a text file. Running the **cat** command on a true binary file would return unreadable output.

   If this file is being controlled by the Data Links File Manager, you will receive the following error:

   ```
   Cannot open /test/pictures/psmith.bmp
   ```

2. Log out.

Now you can verify the sample file is accessbile.

Related tasks:

- "Verifying the sample file is accessible (AIX)" on page 59
- "Registering the Data Links Server with the DB2 database (AIX)" on page 57

Verifying the sample file is accessible (AIX)

You need to verify that the `psmith.bmp` sample file can be accessed while it is under the control of the Data Links File Manager. *Verifying the sample file is accessible* is part of the larger task of *Verifying the installation of DB2 Data Links Manager*.

Procedure:

To verify the sample files is accessible, you first need to generate an *access token* on the DB2 Universal Database server.

1. Log on to the system with a valid DB2 user ID that has System Administrative (SYSADM) authority on the VALIDATE instance that you created. By default, any user that belongs to the primary group of the instance owner has SYSADM authority on an instance.
2. Run the db2profile or db2cshrc script as follows:

   ```
   . INSTHOME/sqllib/db2profile    (for bash, Bourne or Korn shell)
   source INSTHOME/sqllib/db2cshrc (for C shell)
   ```

   where *INSTHOME* represents the home directory of the instance owner.
3. Start the VALIDATE instance by entering the **db2start** command.
4. Connect to the STAFF database by entering the following command:

   ```
   db2 connect to staff
   ```
5. Select the controlled file by issuing an SQL SELECT statement.

   For the example, enter the following command:

   ```
   db2 "select dlurlpath(picture) from employee where lname = 'Smith'"
   ```

   This command returns the full pathname with an access token of the form:

   ```
   controlled_filepath/access_token;controlled_filename
   ```

   where:
   - *controlled_filepath* represents the fully qualified path of the controlled file
   - *access_token* represents an encrypted key assigned by the database manager.
   - *controlled_filename* represents the name of the file that is under the control of a Data Links Filesystem Filter.

   For example, you will receive an access token that is similar to the following:

   ```
   /test/pictures/HVJ5NXGC0WQ.I5KKB6;psmith.bmp
   ```

   This access token will be used to read this file on the Data Links server.

   Note: By default, this access token is only valid for 60 seconds. This means that once you enter this command, you have only 60 seconds to complete the remaining steps in this section. You can increase the access token expiry time by updating the *dl_expint* database configuration parameter.

   To change the default expiration time for an access token to 10 minutes (the value is entered in seconds), enter the following commands:

   ```
   db2 update db cfg for staff using dl_expint 600
   db2 terminate
   db2 connect to staff
   ```

   If you change a setting for any database configuration parameter, you must always reconnect to the database for the changes to take effect.
6. Log out.

Now you can view the sample file.

Related concepts:

- "Configuration parameters" in the *Administration Guide: Performance*

Related tasks:

- "Viewing the sample file (AIX)" on page 61

Viewing the sample file (AIX)

You can use the access token to view the `psmith.bmp` file. *Viewing the sample file* is part of the larger task of *Verifying the installation of DB2 Data Links Manager*.

Prerequisites:

- Log on to the system as any user ID *except* as a user ID with `root` authority or as the DB2 Data Links Manager Administrator.

Procedure:

To view the sample file:

1. Verify that you can access the file that is under the control of the Data Links File Manager.

   Enter the following command:

   ```
   cat "/test/pictures/access_token;psmith.bmp"
   ```

   where *access_token* represents the encrypted key that you received in the previous step.

   You should receive the following output from this command:

   ```
   "This is a picture of Paul Smith."
   ```

If you did not receive an error, you have access to this file and you have installed and configured DB2 Data Links Manager correctly.

Related tasks:

- "Verifying the sample file is accessible (AIX)" on page 59
- "Applying a FixPak for Data Links Manager on AIX" on page 61

Applying a FixPak for Data Links Manager on AIX

To apply the Data Links Manager FixPak on AIX:

1. As the DB2 Data Links Manager Administrator, bring down the DB2 Data Links Manager by running the following commands:

   ```
   dlfm stop
   dlfm stopdbm
   ```

   Ensure that there are no DB2 or DLFM processes remaining.
2. As root, unmount each dlfs filesystem (filesystems controlled by the DB2 Data Links Manager) by running the following command:

   ```
   umount /filesystem_name
   ```

   where `/filesystem_name` represents the name of the dlfs filesystem which you want to unmount.
3. As root, unload the DLFS device driver by running the following command:

   ```
   strload -uf /usr/opt/db2_08_01/cfg/dlfs_cfg
   ```
4. Install the FixPak.
5. After successful installation of the FixPak, as root, update the Data Links Manager instance by running the following command:

   ```
   /usr/opt/db2_08_01/instance/dlfmupdt dlm_instance_name
   ```

where dlm_instance_name represents the name of the DB2 Data Links Manager Administrator.

6. As root, load the DLFS device driver by running the following command:

   ```
   strload -f /usr/opt/db2_08_01/cfg/dlfs_cfg
   ```

7. As root, mount each of the DLFS filesystems by running the following command:

   ```
   mount -v dlfs /filesystem_name
   ```

8. As the DB2 Data Links Manager Administrator, run the following commands to bring up the DB2 Data Links Manager:

   ```
   dlfm bind
   dlfm start
   ```

Related concepts:

- "Before you install DB2 Data Links Manager (AIX)" on page 35

Related reference:

- "What's new in DB2 Data Links Manager Version 8" on page 1

Chapter 4. Installing Data Links Manager on the Solaris Operating Environment

Before you install DB2 Data Links Manager (Solaris Operating Environment)

Read this information carefully before installing DB2® Data Links Manager.

Supported operating systems, kernel levels and kernel architectures

Ensure that you are running one of the following versions with a 32-bit kernel:

- Solaris™ Version 7
- Solaris Version 8

Kernel architectures sun4d and sun4m are not supported.

To check the operating system level, enter the **uname -r** command. This command is only valid for Solaris Version 7 and later. To check the kernel level, enter the **isainfo -v** command. The **isainfo** command should return `32-bit sparc applications`.

To start your system with a 32-bit kernel, enter the **setenv boot-file kernel/unix** command at the **OK** prompt. Then, enter the **boot** command to start the boot process.

Disk space requirements

Ensure that there is at least 85 MB of free disk space in the `/opt/IBM/db2` directory. To check available free disk space, enter the **df -k /opt/IBM/db2** command.

Registry variable size for DATALINK columns

Any DB2 database using at least one DATALINK column in Version 8 will require an increase in the APP_CTL_HEAP_SZ registry variable to avoid failures in such utilities as Reconcile and Load. The default for APP_CTL_HEAP_SZ is 128 (4KB pages). It is recommended that you increase this to 256 in a DB2 database using DATALINK column(s). The following command can be used to increase this value as described:

```
db2 update db cfg for <dbname> using APP_CTL_HEAP_SZ 256
```

If you have already increased this value for other reasons, it is recommended that you further increase this value by 128. If you already use 256, the addition of one or more DATALINK columns would mean further increasing this setting to 256+128=384).

Data Links Manager Administrator user ID

During installation, you are given the option to create the owner of the DB2 Data Links instance in the **Set user information for the Data Links installation** panel. These installation instructions assume that you selected this option.

When you create the Data Links Manager Administrator user ID, the DB2 Setup wizard adds this user with the username *dlfm* and the password *ibmdb2*. You can accept these default values, specify an existing username, or create a different username by changing the default values. For security reasons, it is recommended that you specify your own username and

password because the default values are used in every DB2 Data Links installation and therefore are well-known. The Data Links Manager Administrator user ID is also used for the Data Links Manager instance.

If your machine is an NIS client, you will need to specify your own existing username. The existing username you specify:

- Must *not* have its home directory reside on a file system that uses a Data Links Filesystem Filter.
- Must have a username that is eight characters or less.
- Must *not* be a user with `root` authority.

To create a user ID for the DB2 Data Links Manager Administrator:

1. Log in as a user with root authority.
2. Create the group for the DB2 Data Links Administrator (for example, dlfmgrp) :

   ```
   groupadd dlfmgrp
   ```

3. Create the write group (for example, dlfmxgrp):

   ```
   groupadd dlfmxgrp
   ```

   When a file is linked to a DATALINK column defined with WRITE PERMISSION ADMIN, the file will be changed to be owned by this group.

   The DLFMXGRP group is created for use with the update in place functionality for any file linked to a DATALINK column defined with WRITE PERMISSION ADMIN. The DLFMGRP group is also created. You should not add any user IDs to these groups; DLFM should be the only user ID to create a file that's owned by the DLFM.
4. Create the user ID for the DB2 Data Links Administrator (for example, dlfm), using the `/home/dlfm` directory as the home directory of the Data Links Administrator:

   ```
   useradd -g dlfmgrp -G dlfmxgrp -d /home/dlfm dlfm
   ```

5. Assign a password to this username by entering the **passwd** *user* command, where *user* represents the account that you created.

The DB2 Data Links Manager Administrator user ID is not only for the purpose of administrating the Data Links File Manager, but also to own the DLFM_DB and files that are in a linked state. The DB2 Data Links Manager Administrator should never own directories on a file system that is under the control of a Data Links Filesystem Filter (DLFF). The DB2 Data Links Manager Administrator user ID should only be used to administer the Data Links File Manager (DLFM). You can have the DB2 Data Links Manager Administrator user ID as the owner of files, but only READ PERMISSION DB linked files. You should not manually create files with the DB2 Data Links Manager Administrator as the owner.

If you create a different username by changing the default values, you must ensure that the username you specify is eight characters or less.

Disk space requirements for DB2 Data Links Manager Administrator user ID

Ensure that there is at least 70 MB of free disk space in the home directory where the DB2 Data Links Manager Administrator's home directory will reside. To check available free disk space, enter the **df -k** *INSTHOME* command, where *INSTHOME* represents the home directory of the Data Links Administrator user ID.

Memory requirements

Ensure that there is at least 256 MB of memory available to your system. To check available memory, enter the **/usr/bin/dmesg | grep -i "avail mem"** command.

Updating kernel parameters

Before installing your DB2 for Solaris product using the DB2 Setup wizard or the **db2_install** and **pkgadd** commands, you might need to update your system's kernel configuration parameters. The values in Table 1 are the recommended Solaris kernel configuration parameters.

You must restart your machine after updating any kernel configuration parameters.

Table 1. Recommended Solaris Version 7 kernel configuration parameters values

Kernel Parameter	Physical Memory			
	64MB - 128MB	128MB - 256MB	256MB - 512MB	512MB+
msgsys:msginfo_msgmax msgsys:msginfo_msgmnb msgsys:msginfo_msgmap msgsys:msginfo_msgmni msgsys:msginfo_msgssz msgsys:msginfo_msgtql msgsys:msginfo_msgseg	65535(1) 65535(1) 130 128 16 256 8192	65535(1) 65535(1) 258 256 16 512 16384	65535(1) 65535(1) 258 256 16 1024 32767(2)	65535(1) 65535(1) 258 256 16 1024 32767(2)
shmsys:shminfo_shmmax shmsys:shminfo_shmseg shmsys:shminfo_shmmni	67108864 50 300	134217728(2) 50 300	268435456(3) 50 300	536870912(3) 50 300
semsys:seminfo_semmni semsys:seminfo_semmap semsys:seminfo_semmns semsys:seminfo_semmnu semsys:seminfo_semume	128 130 256 256 50	256 258 512 512 50	512 514 1024 1024 50	1024 1026 2048 2048 50
dlfsdrv:glob_mod_pri[1] dlfsdrv:glob_mesg_pri[1] dlfsdrv:ConfigDlfsUid[1] dlfsdrv:ConfigDlfsGid[1]	0x100800 0xff UID[2] GID[3]	0x100800 0xff UID[2] GID[3]	0x100800 0xff UID[2] GID[3]	0x100800 0xff UID[2] GID[3]

[1] These values are mandatory.
[2] UID represents the user ID of the of the Data Links Manager Administrator.
[3] GID represents the group id of the write group.
See the Data Links Manager Administrator user ID section.

Table 2. Recommended Solaris version 8 kernel configuration parameters values

Kernel Parameter	Physical Memory
	512MB+
msgsys:msginfo_msgmax msgsys:msginfo_msgmnb msgsys:msginfo_msgmap msgsys:msginfo_msgmni msgsys:msginfo_msgssz msgsys:msginfo_msgtql msgsys:msginfo_msgseg	65535 65535 1026 1024 32 2048 32767(2)
shmsys:shminfo_shmmax shmsys:shminfo_shmseg shmsys:shminfo_shmmni	0xe0000000 500 1024
semsys:seminfo_semmni semsys:seminfo_semmap semsys:seminfo_semmns semsys:seminfo_semmnu semsys:seminfo_semume	1024 1026 2048 2048 50

Table 2. Recommended Solaris version 8 kernel configuration parameters values (continued)

Kernel Parameter	Physical Memory
	512MB+
dlfsdrv:glob_mod_pri[1]	0x100800
dlfsdrv:glob_mesg_pri[1]	0xff
dlfsdrv:ConfigDlfsUid[1]	UID[2]
dlfsdrv:ConfigDlfsGid[1]	GID[3]

[1] These values are mandatory.
[2] UID represents the user ID of the of the Data Links Manager Administrator.
[3] GID represents the group id of the write group.
See the Data Links Manager Administrator user ID section.

Version levels of DB2 Data Links and DB2 Universal Database™

DB2 Universal Database can be any of Version 6.1, 7.1, 7.2, and 8.1. Data Links Manager can be any of Version 7.1, 7.2, and 8.1. For example, DB2 UDB can be at Version 7.1 or Version 8.1 and Data Links Manager can be at Version 8.1. To check the version of DB2 that resides on a workstation, enter the **db2level** command. These versions of DB2 UDB and Data Links Manager can be used in any combination.

If DB2 is at the higher version, such as Version 8.1, the Data Links Manager features introduced in Version 8.1 will not be available when you connect to a Data Links Manager at Version 7. You will receive an SQL error if you attempt to use the Version 8 features.

Migrating from previous versions

Different levels of DB2 Data Links Manager instances cannot exist on the same machine. If you have a pre-Version 8.1 Data Links instance on your system, you must migrate the instance to the Version 8.1 format using the **db2imigr** command.

Registry variables offer more function and flexibility than environment variables. However, because of this, it is possible that migration will not be performed exactly as expected. The registry variables should be checked using the **db2set** command after migration.

Data Links server security

In releases prior to DB2 Data Links Version 8.1, there were no security controls on linking a file. If you migrated from a previous release, you will be given the option at DLFM migration time to enable these security controls on your existing DLFM server(s).

Migrating from DB2 Data Links Version 7.1 or 7.2 to DB2 Data Links Manager Version 8

To migrate from DB2 Data Links Manager Version 7.1 or 7.2 to DB2 Data Links Manager Version 8.1:

1. Prepare your DB2 and DLFM databases for migration. For example, you can backup your existing databases.
2. Install DB2 Version 8 on your DB2 server and Data Links Manager server machines. These tasks are detailed below.
3. As DLFM, run the **db2dlmmg** command.

When you migrate to DB2 Data Links Manager Version 8, the following environment variables will be converted to DB2 registry variables:

```
DLFM_INSTALL_PATH
DLFM_PORT
   DLFM_BACKUP_DIR_NAME (1)
DLFM_BACKUP_TARGET (2)
DLFM_BACKUP_TARGET_LIBRARY (3)
```

Notes:

1. This variable is only used if a local file system is the backup target.
2. Used to indicate the type of backup target used. Possible values for this variable are LOCAL, TSM, or XBSA.
3. Used to indicate the XBSA support code library only if the DLFM_BACKUP_TARGET is set to XBSA. The support code library must be fully qualified and must include the shared object name, for example `/opt/IBM/db2/v8.1/Legato/libxdb2.so(bsashr10.o)`. The name of the shared object, in this case `bsashr10.o`, is available from the vendor suppling the XBSA compliant shared library.

DLFM database migration utility

The DLFM database migration utility, **db2dlmmg**, converts an existing DLFM database from its DB2 Version 7.1 or Version 7.2 format to the new DB2 Version 8.1 format. The only DB2 database with which this utility should be run is the one that resides on a DLFM server. This database is called DLFM_DB, and by default belongs to the DB2 instance called DLFM, owned by the Data Links Manager Administrator. Each occurrence of this database, one per DLFM server, must be migrated independently using the **db2dlmmg** utility.

The **db2dlmmg** utility is installed in the `INSTHOME/sqllib/adm` directory, where INSTHOME represents the home directory of the Data Links Manager Administrator.

Before running the **db2dlmmg** utility, you must have installed the DB2 Version 8.1 Data Links Manager. You should not attempt to run the **db2dlmmg** utility from prior releases against a DLFM_DB database. You must also already have run the DB2 Instance Migration (**db2imigr**) utility against the DLFM database instance.

The DLFM database migration utility performs the following basic steps:

1. Stops the DLFM if it is running.
2. Requests how you would like your Version 8.1 Data Links Manager linked file security controls set up.
3. Verifies that the current DLFM_DB contents are in a valid pre-Version 8.1 format.
4. Automatically backs up the current DLFM_DB database.
5. Increases the amount of log space reserved for this database.
6. Creates new buffer pools and tablespaces.
7. Creates and alters tables and indexes.
8. Moves the largest DLFM_DB table into one of the new tablespaces.
9. Sets up the linked file security controls as specified in step 2.
10. Rebinds the DLFM executables to the modified database.

If the migration utility detects an error during its processing, it will provide an error message with instructions on how to proceed. In some cases, you will be able to correct the problem and simply re-run **db2dlmmg**. In many cases, however, you will be instructed to *first* restore the original DLFM_DB (backed up in step 4 above), and then re-run

db2dlmmg. The backup in step 4 is stored in the location specified by the DLFM configuration variables DLFM_BACKUP_TARGET and DLFM_BACKUP_DIR_NAME. To restore the original database, you run the DB2 restore utility as follows:

- `db2start`
- `db2 restore database dlfm_db from <backup-directory>[taken at <date-time>] without rolling forward`

  <backup-directory> represents the fully qualified path specified in DLFM_BACKUP_DIR_NAME, and taken at <date-time> must be specified if there are multiple backup images under <backup-directory>.

To view the values of the configuration variables DLFM_BACKUP_TARGET and DLFM_BACKUP_DIR_NAME, enter the commands:

- `db2set DLFM_BACKUP_TARGET`
- `db2set DLFM_BACKUP_DIR_NAME`

If the value of the DLFM_BACKUP_TARGET variable is either ″TSM″ or ″XBSA″, the required restore command above will be different. Refer to the description of the RESTORE utility for accessing backups in TSM or an XBSA archive server.

To run the DLFM database migration utility, perform the following steps on each DLFM server:

1. Log in to the DLFM server using the Data Links Manager Administrator id.
2. Ensure sufficient free space is available in the filesystem pointed to by the DLFM_BACKUP_DIR_NAME configuration variable. There must be at least enough space for a full backup of the DLFM_DB database. (Allow enough space for at least two DLFM_DB backups. See step 7 below for details.)
3. Ensure sufficient free space for the increased transaction log files in the DLFM instance filesystem. The LOGPRIMARY configuration variable will be increased to 6 (if previously less than 6). The LOGFILSIZ configuration variable will be increased to 2000 (if previously less than 2000). You can view the current settings for these variables by entering the **db2 get db cfg for dlfm_db** command.
4. Ensure sufficient additional free space for work files (used by **db2dlmmg**) in the DLFM instance filesystem. You can use the amount of space currently used by the DLFM_DB as an estimate of this additional amount of space required.
5. Run the migration utility by entering the **db2dlmmg** command.
6. Allow the migration utility to run *uninterrupted* to completion. Depending upon the size of the DLFM_DB, it can run for several minutes or possibly as long as an hour. Progress of the migration will be reported to the screen with various status messages. In the event of an error, follow the instructions documented for the given error messages, and then re-run the **db2dlmmg** command.
7. Once the migration utility completes successfully, you should manually take a full backup of the DLFM_DB for full recoverability of the DLFM server under Version 8.1 (The migration utility does not do this automatically.)

Some important points to note:

- Once you have completed the above procedure, you will be able to perform all Version 8.1 DLFM operations. You should issue the *dlfm start* command to verify that the Version 8.1 Data Links File Manager starts successfully with the new DLFM_DB. To verify that the DLFM is running, you can check for the DLFM processes by using the **dlfm see** command.
- You should also then either follow the installation validation instructions described in the Data Links Manager installation documentation or use your existing Data Links application to verify correct operation of the Data Links Manager.
- Do *not* attempt to restore *any* backups of the DLFM_DB from prior to the migration. The pre-Version 8.1 backups are no longer usable with the Version 8.1 Data Links Manager.
- If you have problems with the migration, you should contact IBM® Service. *Never* attempt to manually update the contents of the DLFM_DB except with the assistance of IBM Service.

DLFM user account

In addition to the DB2 Data Links Manager Administrator user account, the DLFM user account is also created during installation for use by the Data Links File Manager. The DLFM user account is the owner of all READ PERMISSION DB files.

TCP/IP port number

You must have a TCP/IP port available for use by the Data Links File Manager. By default, the DB2 Setup wizard generates a value for you. You can use this value or provide your own. You will need to know this port number to verify the installation.

If you want to specify your own port number, review the TCP/IP ports that are already in use on a machine by opening the `/etc/services` file. You will need to specify this port during the installation.

Once you have selected a TCP/IP port number for use by the DLFM, the value should not be changed.

Determining hostnames

You must determine the names of each of your DB2 servers and Data Links servers. You will need to know these hostnames to verify the installation. When connecting to a DB2 Data Links File Manager, the DB2 UDB server internally sends the following information to the DLFM:

- Database name
- Instance name
- Hostname

The DLFM then compares this information with its internal tables to determine whether the connection should be allowed. It will allow the connection only if this combination of database name, instance name, and hostname has been registered with it, using the dlfm add_db command. The hostname that is used in the dlfm add_db command must exactly match the hostname that is internally sent by the DB2 UDB server.

The DLFM then verifies this information to decide if a connection from this particular DB2 server should be allowed. The subroutine that obtains hostname information on the DB2 server, `gethostbyname`, looks for `/etc/resolv.conf`. If this file exists, the subroutine queries the domain name server. If the request to the DNS times out, the `gethostbyname`

routine checks the local /etc/hosts file. To connect successfully to the DLFM, the name registered on the DLFM must be the one which is obtained by the gethostbyname routine on the DB2 UDB server.

Use the output of the **uname -n** command for the hostname when registering a DB2 UDB database using the **dlfm add_db** command. The DB2 server's internal connections to the DLFM will fail if any other aliases are used in the **dlfm add_db** command.

Repeat this on each DB2 Data Links and DB2 UDB server.

A Data Links server is registered to a DB2 database using the DB2 **add datalinks manager for database** *database_alias* **using node** *hostname* **port** *port_number* command.

The hostname is the name of the Data Links server. Any valid alias of the Data Links server can be used in this command. DATALINK values that are references to this Data Links server must specify the hostname in the URL value; that is, the exact name that was used in the **add datalinks manager** command must be used when assigning URL values to DATALINK columns. Using a different alias will cause the SQL statement to fail.

Synchronize system clocks

Ensure that the system clocks on the Data Links server and the remote DB2 server are synchronized and remain synchronized for linked files in the DATALINKS columns with the READ PERMISSION DB option. Synchronization of clocks is essential for the Data Links token expiry interval to work correctly. The token expiry interval is a database configuration parameter that controls how long a selected DATALINK value (consisting of a URL with an embedded file authorization token) can be used. To check the system time and date, enter the **date** command.

For more information on synchronizing system clocks, refer to the *Solaris Administration Guide*.

Data Links replication

Data Links Manager Version 8.1 introduces two new registry variables, DLFM_START_ASNCOPYD and DLFM_ASNCOPYD_PORT. During installation, you will be prompted to enable the Data Links Manager Replication daemon. If you plan to use Data Links Replication, you should enable the Replication daemon during the installation. You can also enable it after installation by setting the registry variables (DLFM_START_ASNCOPYD and DLFM_ASNCOPYD_PORT) and restarting the DLFM.

Related concepts:

- "DB2 Data Links Manager" on page 2
- "Introduction to Data Links Manager security" in the *DB2 Data Links Manager Administration Guide and Reference*

Related tasks:

- "Installing DB2 Data Links Manager using the DB2 Setup wizard (Solaris Operating Environment)" on page 71
- "Installing DB2 Data Links Manager manually using the db2_install command (Solaris Operating Environment)" on page 72
- "Migrating DB2 UDB (UNIX)" in the *Quick Beginnings for DB2 Servers*

- "Enabling the Data Links Manager Replication daemon" in the *DB2 Data Links Manager Administration Guide and Reference*

Installing DB2 Data Links Manager using the DB2 Setup wizard (Solaris Operating Environment)

After updating your Solaris Operating Environment kernel configuration parameters, you can begin installing DB2 Data Links Manager. The DB2 Setup wizard is the recommended method for installing DB2 Data Links Manager for Solaris Operating Environment.

Prerequisites:

Log in as a user ID with root authority.

Procedure:

To install the DB2 Data Links Manager for Solaris using the DB2 Setup wizard:

1. Insert and mount your DB2 product CD-ROM.
2. Change to the directory where the CD-ROM is mounted by entering the **cd /cdrom** command where **cdrom** is the mount point of your product CD-ROM.
3. Enter the **./db2setup** command. The Launchpad opens.
4. Select **Install Products**.
5. Select the products you want and are licensed to install. Click **Next** to launch the DB2 Setup wizard.

   You can choose the product's **Customize** option to view and change the components that will be installed.

   Select **Next** to continue the installation process or **Cancel** to go back to a previous window. Select **Help** for more information or assistance during the installation of any DB2 product.

When installation is complete, DB2 Data Links Manager will be installed in the `/opt/IBM/db2/V8.1/` directory.

You can use the DB2 Setup wizard at any time to create another instance or install additional DB2 products or components. Log in as a user ID with root authority and run the **./db2setup** command from your DB2 product CD-ROM.

If you want your DB2 product to have access to DB2 documentation either on your local computer or on another computer on your network, then you must install the DB2 Information Center. The DB2 Information Center contains documentation for DB2 Universal Database and DB2 related products.

Related concepts:

- "DB2 Data Links Manager" on page 2
- "Before you install DB2 Data Links Manager (Solaris Operating Environment)" on page 63
- "DB2 Information Center" on page 92
- "DB2 Information Center installation scenarios" on page 93

Related tasks:

- "Verifying the installation (Solaris Operating Environment)" on page 76

- "Installing DB2 Data Links Manager manually using the db2_install command (Solaris Operating Environment)" on page 72
- "Installing the DB2 Information Center using the DB2 Setup wizard (UNIX)" on page 95

Installing DB2 Data Links Manager manually using the db2_install command (Solaris Operating Environment)

The DB2 Setup wizard is the recommended method for installing all DB2 products on UNIX-based operating systems. This wizard can perform all of the tasks required to install DB2 Data Links Manager. However, if you want more control of the install process, you can manually install DB2 Data Links Manager using the **db2_install** command.

Prerequisites:

Log in as a user ID with root authority.

Procedure:

To install DB2 Data Links Manager for Solaris using the **db2_install** command:

1. Insert and mount the appropriate CD-ROM.
2. If the Volume Manager is *not* running on your system, enter the following commands to mount the CD-ROM:

   ```
   mkdir -p /cdrom/unnamed_cdrom
   mount -F hsfs -o ro /dev/dsk/c0t6d0s2 /cdrom/unnamed_cdrom
   ```

   where */cdrom/unnamed_cdrom* represents the CD-ROM mount directory and `/dev/dsk/c0t6d0s2` represents the CD-ROM drive device.

   Note: If you are mounting the CD-ROM drive from a remote system using NFS, the CD-ROM file system on the remote machine must be exported with root access. You must also mount that file system with root access on the local machine.

   If the Volume Manager (vold) *is* running on your system, the CD-ROM is automatically mounted as:

   ```
   /cdrom/unnamed_cdrom
   ```

3. Run the **db2_install** command as follows:

   ```
   /cdrom/unnamed_cdrom/db2_install
   ```

   The **db2_install** command prompts for one or more of the following to be installed, and for the base directory where the product files are to be installed. The products are listed by keyword and product description.

   DB2.DLM
   DB2 Data Links Manager for Solaris

   The command displays the following prompt: `Specify one or more of the keywords separated by spaces.`
4. Type the keyword of the product to be installed when prompted.
5. Type the name of the base directory when prompted. The default base directory is `/opt`.

   If the default base directory is used, all files will be installed in the `/opt/IBM/db2/V8.1` directory.

6. Enter `Yes` to start the product installation.

If you want your DB2 product to have access to DB2 documentation either on your local computer or on another computer on your network, then you must install the DB2 Information Center. The DB2 Information Center contains documentation for DB2 Universal Database and DB2 related products.

Related concepts:

- "DB2 Data Links Manager" on page 2
- "Before you install DB2 Data Links Manager (Solaris Operating Environment)" on page 63
- "DB2 Information Center" on page 92
- "DB2 Information Center installation scenarios" on page 93

Related tasks:

- "Verifying the installation (Solaris Operating Environment)" on page 76
- "Installing DB2 Data Links Manager using the DB2 Setup wizard (Solaris Operating Environment)" on page 71
- "Installing the DB2 Information Center using the DB2 Setup wizard (UNIX)" on page 95

Actions performed by the DB2 Setup wizard (Solaris Operating Environment)

After installation is complete and before you exit the DB2® Setup wizard, you can select **View Log** to review the installation process. You can also review the `/tmp/db2setup.log` file for more detailed information. If you ran the **./db2setup -t /tmp/trace.out** command to capture any installation errors, you can review the trace log in `/tmp/trace.out`.

The following actions are performed by the DB2 Setup wizard:

Installation directory
DB2 Data Links Manager and DB2 Universal Database™ are installed in the `/opt/IBM/db2/V8.1/` directory. DB2 Data Links Manager uses DB2 UDB to maintain logged information for the linked files.

Group and user IDs
A group ID (gid) and user ID (uid) are created for the DB2 Data Links Manager Administrator, if you selected to do so during installation.

Instance creation
An instance for the Data Links File Manager is created. The default instance, associated with the default group and user ID, is called `DLFM`.

Registry variables
The following registry variables are set:

```
DLFM_PORT=port_number
   DB2_HASH_JOIN=ON
DLFM_INSTALL_PATH=/home/instance/sqllib/bin
   //where instance is the Data Links Administrator ID
DLFM_INSTANCE_NAME=instance_name
DB2INSTANCE=instance_name
DLFM_BACKUP_DIR_NAME=$HOME/dlfmbackup   //UFS only
DLFM_BACKUP_TARGET=LOCAL
    //You have three choices: LOCAL, TSM, and XBSA
```

```
DLFM_FS_ENVIRONMENT=NATIVE    //the only value available on Solaris™
DLFM_START_ASNCOPYD=NO       //or YES if you have enabled it
DLFM_ASNCOPYD_PORT=65535
DLFM_NUM_ARCHIVE_SUBSYSTEMS=2
```

where:

- *port_number* represents the port number reserved for the Data Links File Manager.
- *instance_name* represents the name of the Data Links File Manager instance.

DLFM_AUTOSTART registry variable

With Data Links Manager, the installer has an option to request that the DLFM be started on any reboot of the machine on which Data Links Manager is installed. After installing Data Links Manger, the reboot will automatically load the DLFF and mount all defined DLFS file systems. However, the startup of the DLFM is optional.

If this option is selected during the installation, then the DB2 registry variable DLFM_AUTOSTART is set to "YES". Upon reboot, the **dlfm start** command will be issued (by means of an entry in the `/etc/inittab` file).

If this option is *not* selected during install, then the DB2 registry variable "DLFM_AUTOSTART" is set to "NO". Upon reboot, no **dlfm start** command will be issued.

If after installation, you want to alter this behavior, you need to simply change the value of the DLFM_AUTOSTART DB2 registry variable using the **db2set** command. For example, `db2set DLFM_AUTOSTART=YES`. The effect of this change will be seen upon reboot of the system. If the variable is not set at all, its default value is "NO".

PATH variables

The following variables are set in the DB2 Data Links Manager Administrator's `db2profile` or `db2cshrc` script file:

```
(for bash, Bourne, or Korn shell)
export PATH=$PATH:$HOME/sqllib/bin:$HOME/sqllib/adm:$HOME/sqllib/misc
(for C shell)
setenv PATH=${PATH}:${HOME}/sqllib/bin:${HOME}/sqllib/adm:${HOME}/sqllib/misc
```

To run the DB2 Data Links Manager Administrator's `db2profile` or `db2cshrc` script file each time this user ID logs on to the system, add the following entry to the DB2 Data Links Manager Administrator's .profile script file:

```
. INSTHOME/sqllib/db2profile (for bash, Bourne, or Korn shell)
source INSTHOME/sqllib db2cshrc (for C shell)
```

where *INSTHOME* represents the home directory of the DB2 Data Links Manager Administrator.

Virtual File System setup

The directory dlfs is created under `/usr/lib/fs/`. The directory `/usr/lib/fs/dlfs` would contain the dlfs helpers.

DB2 database DLFM_DB created

A DLFM_DB database is created on the node containing DB2 Data Links Manager.

Related concepts:

- "Before you install DB2 Data Links Manager (Solaris Operating Environment)" on page 63

Related tasks:

- "Installing DB2 Data Links Manager using the DB2 Setup wizard (Solaris Operating Environment)" on page 71
- "Installing DB2 Data Links Manager manually using the db2_install command (Solaris Operating Environment)" on page 72

Verifying the DLFM_DB was successfully created and catalogued (Solaris Operating Environment)

Once the DB2® Setup wizard has finished installing DB2 Data Links Manager on your system, you should ensure that it successfully created and catalogued the DLFM_DB database by listing the contents of the System Database Directory. Once you have verified that this database exists, you need to set up a backup and recovery scheme to aid in crash recovery and protect the integrity of your data.

Procedure:

To verify that the DLFM_DB database was successfully created and catalogued:

1. Run the db2profile or db2cshrc script as follows:

   ```
   . INSTHOME/sqllib/db2profile    (for bash, Bourne or Korn shell)
   source INSTHOME/sqllib/db2cshrc (for C shell)
   ```

   where *INSTHOME* represents the home directory of the instance owner.
2. Retrieve the entry for the DLFM_DB database in the System Database Directory:

   ```
   db2 list database directory
   ```

   This command returns output similar to the following:

   ```
   System Database Directory

   Number of entries in the directory = 1

   Database 1 entry:

   Database alias                 = DLFM_DB
   Database name                  = DLFM_DB
   Local database directory       = /home/dlfm

   Database release level         = 9.00
   Comment                        =
   Directory entry type           = Indirect (1)
   Catalog node number            = 0
   ```

Related concepts:

- "Before you install DB2 Data Links Manager (Solaris Operating Environment)" on page 63

Related tasks:

- "Installing DB2 Data Links Manager using the DB2 Setup wizard (Solaris Operating Environment)" on page 71

Verifying the installation (Solaris Operating Environment)

This topic describes how to verify your installation on Solaris Operating Environment. It helps you configure a DB2 Data Links Manager environment to control files that are linked to DATALINK columns on a DB2 Universal Database server.

Procedure:

To verify the installation of Data Links Manage:

1. Create a test environment on the DB2 server.
2. Create a test environment on the DB2 Data Links server.
3. Register the Data Links Server with the DB2 database.
4. Verify the sample file is controlled by DLFF.
5. Verify the sample file is accessible.
6. View the sample file.

Related concepts:

- "Before you install DB2 Data Links Manager (Solaris Operating Environment)" on page 63

Related tasks:

- "Creating a test environment on the DB2 server (Solaris Operating Environment)" on page 76
- "Creating a test environment on the DB2 Data Links server (Solaris Operating Environment)" on page 78
- "Registering the Data Links server with the DB2 database (Windows)" on page 29
- "Verifying the sample file is controlled by DLFF (Solaris Operating Environment)" on page 85
- "Verifying the sample file is accessible (Solaris Operating Environment)" on page 85
- "Viewing the sample file (Solaris Operating Environment)" on page 87
- "Installing DB2 Data Links Manager using the DB2 Setup wizard (Solaris Operating Environment)" on page 71
- "Installing DB2 Data Links Manager manually using the db2_install command (Solaris Operating Environment)" on page 72

Installation verification tasks

Creating a test environment on the DB2 server (Solaris Operating Environment)

Creating a test environment on the DB2 server is part of the larger task of *Verifying the Data Links Manager installation*.

Prerequisites:

- Log on to the system with a valid DB2 user ID that has root authority.

- A valid DB2 user ID that has System Administrative (SYSADM) authority on the VALIDATE instance that you will create. By default, any user ID that belongs to the primary group of the instance owner has SYSADM authority on an instance.

Procedure:

To create a test environment on the DB2 server:

1. Create an instance on the DB2 server using the **db2icrt** command. This instance will contain a database where tables containing columns of the DATALINK data type will reside.

   In the example, create an instance called VALIDATE by entering the following commands:

   ```
   groupadd testers
   useradd pgrp='testers' groups='testers' home='/home/validate' validate
   /opt/IBMdb2/V8.1/instance/db2icrt -u validate validate
   ```

2. Log out.
3. Log on to the system with a valid DB2 user ID that has System Administrative (SYSADM) authority on the VALIDATE instance that you created. By default, any user ID that belongs to the primary group of the instance owner has SYSADM authority on an instance.
4. Ensure that the VALIDATE instance is the current instance by entering the following command:

   ```
   db2 get instance
   ```

   This command should return the following output:

   ```
    The current database manager instance is:  VALIDATE
   ```

   If you do not receive this output, enter the following commands:

   ```
   set DB2INSTANCE=VALIDATE
   db2 get instance
   ```

5. Set the DATALINKS database manager configuration parameter to *YES* in the VALIDATE instance's configuration file by entering the following command:

   ```
   db2 update dbm cfg using datalinks yes
   ```

   To disable DB2 Data Links Manager functionality on your DB2 server, you would set the DATALINKS database manager configuration parameter to *no*.
6. Start the VALIDATE instance by entering the **db2start** command.

   Note: If you change a setting in an instance's database manager configuration file, you must ensure that you stop and restart the instance (using the **db2stop** and **db2start** commands) for the changes to take effect. In the example, the VALIDATE instance was not started, so only issue the **db2start** command.
7. Create a database using the **db2 create database** command. This database will contain a table using the DATALINK data type.

   For the example, create a database called STAFF by entering the following command:

   ```
   db2 create database staff
   ```

8. Connect to the STAFF database by entering the following command:

   ```
   db2 connect to staff
   ```

9. Create a table called EMPLOYEE, in the STAFF database that you just created, that has a column defined with a DATALINK data type by entering the following command:

```
db2 "create table employee (id int, fname varchar(30),
 lname varchar(30), picture datalink linktype url file
 link control integrity all read permission db write
 permission blocked recovery yes on unlink restore)"
```

10. Terminate all connections to this database by entering the following command:

```
db2 connect reset
```

11. Log out.

Now you can create a test environment on the DB2 Data Links server.

Related tasks:

- "UNIX details when creating instances" in the *Administration Guide: Implementation*
- "Creating a test environment on the DB2 Data Links server (Solaris Operating Environment)" on page 78

Related reference:

- "CREATE DATABASE Command" in the *Command Reference*
- "db2icrt - Create Instance Command" in the *Command Reference*

Creating a test environment on the DB2 Data Links server (Solaris Operating Environment)

Creating a test environment on the DB2 Data Links server is part of the larger task of *Verifying the installation of DB2 Data Links Manager*. After creating a test environment on the DB2 UDB server, you must now create a test environment on the DB2 Data Links server.

Procedure:

To create the test environment on the Data Links server:

1. Prepare your file system for Data Links Manager.
2. Register the file system with the Data Links File Filter.
3. Register the DB2 database.Register the DB2 database.
4. Authorize a DB2 user ID to link a file
5. Create a sample file.

Related tasks:

- "Preparing your file system for Data Links Manager (Solaris Operating Environment)" on page 79
- "Registering the file system with the DLFF (Solaris Operating Environment)" on page 79
- "Registering the DB2 database with the Data Links File Manager (Solaris Operating Environment)" on page 81
- "Authorizing a DB2 user ID to link a file (Solaris Operating Environment)" on page 82
- "Creating the sample file for DB2 Data Links Manager (Solaris Operating Environment)" on page 82
- "Creating a test environment on the DB2 server (Solaris Operating Environment)" on page 76

Preparing your file system for Data Links Manager (Solaris Operating Environment)

Preparing your file system for Data Links Manager is part of the larger task of *Creating a test environment on the DB2 Data Links server*.

You can use an existing file system or create a UNIX File System (UFS) to test your Data Links Manager installation. You can use an existing UFS file system as long as there is no conflict with having it controlled by DLFF.

Prerequisites:

Log in as a user ID with root authority.

Procedure:

To prepare a UFS to use a Data Links Filesystem Filter (DLFF):

1. (Optional) Create a UFS file system using the **newfs** command. You can also use an existing UFS file system. For more information on the options for creating a new file system, refer to your Solaris product documentation.
2. Open the `/etc/vfstab` file, record the entries as:

   ```
   /dev/dsk/c0t0d0s6 /dev/rdsk/c0t0d0s6 /dlfs   dlfs - yes Basefs=ufs
   ```

   where *c0t0d0s6* represents a sample value for this example.
3. (Optional) If you have not set up your file system using the DB2 Setup wizard during installation, you can modify the properties of a file system so that it comes under the control of the DLFF, and mount it by entering the following commands:

   ```
   /opt/IBM/db2/V8.1/instance/dlfmfsmd dlfm_mountpoint
   ```

   where *dlfm_mountpoint* represent the mount point of the UFS you are using.

   For the example, enter the following command:

   ```
   /opt/IBM/db2/V8.1/instance/dlfmfsmd /test
   ```
4. Log out.

Now you can register the file system with the DLFF.

Related tasks:

- "Registering the file system with the DLFF (Solaris Operating Environment)" on page 79

Registering the file system with the DLFF (Solaris Operating Environment)

Registering the file system with the DLFF is part of the larger task of *Creating a test environment on the DB2 Data Links server*.

Prerequisites:

Log on to the system as the DB2 Data Links Manager Administrator.

Procedure:

To register the `/test` file system with the Data Links Filesystem Filter:

1. Run the db2profile or db2cshrc script as follows:

   ```
   . INSTHOME/sqllib/db2profile    (for bash, Bourne or Korn shell)
   source INSTHOME/sqllib/db2cshrc (for C shell)
   ```

   where *INSTHOME* represents the home directory of the instance owner.
2. Start the Data Links File Manager by entering the **dlfm start** command.
3. Ensure that the Data Links File Manager started successfully by entering the **dlfm see** command.

   If the Data Links File Manager back-end processes started successfully and are running, you will receive output similar to the following:

   ```
   PID  PPID PGID RUNAME UNAME ETIME    DAEMON NAME
   1661 1653 1652 root   dlfm  20:40:15 dlfm_mon_wd_(dlfm)
   1665 1653 1652 root   dlfm  20:40:15 dlfm_upcalld_(dlfm)
   1666 1653 1652 root   dlfm  20:40:15 dlfm_delgrpd_(dlfm)
   1674 1663 1652 root   dlfm  20:40:13 dlfm_ar_ag_(dlfm)
   1675 1663 1652 root   dlfm  20:40:13 dlfm_ar_ag_(dlfm)
   1663 1653 1652 root   dlfm  20:40:15 dlfm_archived_(dlfm)
   1653    1 1652 root   dlfm  20:40:18 dlfm_wd_(dlfm)
   1662 1653 1652 root   dlfm  20:40:15 dlfm_cmgrd_(dlfm)
   1664 1653 1652 root   dlfm  20:40:15 dlfm_gcd_(dlfm)
   ```
4. Ensure that you successfully mounted and configured the UFS that is under the control of a DLFF:

   ```
   /usr/sbin/mount -v | awk '$5 == "dlfs"'
   ```

   For the example, this command, on Solaris Version 7 should return output similar to the following:

   ```
   /dev/dsk/c0t1d0s0 on /dlfstest type dlfs rw/suid/Basefs=ufs on Wed Jan 9 08:39:53 2002
   /dev/dsk/c0t2d0s0 on /dlfstest type dlfs rw/suid/Basefs=ufs on Wed Jan 9 08:39:53 2002
   ```

   For the example, this command, on Solaris Version 8 should return output similar to the following:

   ```
   /dev/dsk/c1t1d0s3 on /dlfstest type dlfs read/write/setuid/intr/largefiles/onerr
      or=panic/dev=800043 on Wed Jan 9 08:40:28 2002
   ```
5. Register a file system that is under the control of a Data Links Filesystem Filter by entering the following command:

   ```
   dlfm add_prefix prefix_path
   ```

   where *prefix_path* represents the location of the filesystem that is under the control of a DLFF.

   The following command registers the Data Links server to use the Data Links Filesystem Filter on the test file system:

   ```
   dlfm add_prefix /test
   ```

   To list the registered prefixes, enter the following command:

   ```
   dlfm list registered prefixes
   ```

Now you can register the DB2 database with the Data Links File Manager.

Related tasks:

- "Registering the DB2 database with the Data Links File Manager (Solaris Operating Environment)" on page 81

Related reference:

- "dlfm add_prefix command" in the *DB2 Data Links Manager Administration Guide and Reference*

- "dlfm list registered prefixes command" in the *DB2 Data Links Manager Administration Guide and Reference*

Registering the DB2 database with the Data Links File Manager (Solaris Operating Environment)

Registering the DB2 database with the Data Links File Manager is part of the larger task of *Creating a test environment on the DB2 Data Links server*.

Prerequisites:

Log on to the system as the DB2 Data Links Manager Administrator.

Procedure:

To register a new database with the Data Links File Manager:

1. Register the remote DB2 UDB database where the DATALINK type column was defined by entering the following command:

   ```
   dlfm add_db database instance hostname
   ```

   where

   - *database* represents the database alias name of the remote database.
   - *instance* represents the instance where *database* resides. If you are registering a Windows instance on a Solaris Data Links Manager, *instance* must be in uppercase.
   - *hostname* represents the hostname of the DB2 UDB server where *database* resides.

   The following command will register a database called `STAFF`, which resides in the `VALIDATE` instance on a DB2 UDB server with a hostname of `db2server.services.com`:

   ```
   dlfm add_db staff validate db2server.services.com
   ```

   Do not specify the `DLFM_DB` when you run this command. The DLFM_DB is a local database that is used to keep track of files that are under the control of the Data Links File Manager.

   To list the registered database, enter the following command:

   ```
   dlfm list registered databases
   ```

2. Log out.

Now you can authorize a DB2 user ID to link a file.

Related tasks:

- "Registering the file system with the DLFF (Solaris Operating Environment)" on page 79
- "Creating the sample file for DB2 Data Links Manager (Solaris Operating Environment)" on page 82
- "Authorizing a DB2 user ID to link a file (Solaris Operating Environment)" on page 82

Related reference:

- "dlfm add_db command" in the *DB2 Data Links Manager Administration Guide and Reference*

- "dlfm list registered databases command" in the *DB2 Data Links Manager Administration Guide and Reference*

Authorizing a DB2 user ID to link a file (Solaris Operating Environment)

You can authorize a DB2 user ID to link a file. *Authorizing a DB2 user ID to link a file* is part of the larger task of *Creating a test environment on the DB2 Data Links server*.

Prerequisites:

Log on to the system as the DB2 Data Links Manager Administrator.

Procedure:

To authorize a DB2 user ID to link a file in the example `/test/pictures` directory:

1. Run:

   ```
   dlfm grant link privilege on dir /test/pictures/ to
      user db2-username for db staff inst validate
      node db2server.services.com
   ```

   where *db2-username* must be the user ID with which you log on when you perform the link operation (for example, using the SQL INSERT statement) on DB2.
2. To verify that your **dlfm grant** command was correctly specified:

   ```
   dlfm list registered users for directory "/test/pictures/ on
      db staff inst validate node db2server.services.com
   ```

   This command should return the *db2-username* that was specified above.
3. Log out.

By default, link security controls are set to ENABLED during the installation. Use the **dlfm set link security off** command to disable this feature and the **dlfm set link security on** command to re-enable it.

Now you can create a sample file.

Related tasks:

- "Creating the sample file for DB2 Data Links Manager (Solaris Operating Environment)" on page 82

Related reference:

- "dlfm grant command" in the *DB2 Data Links Manager Administration Guide and Reference*
- "dlfm set link security command" in the *DB2 Data Links Manager Administration Guide and Reference*

Creating the sample file for DB2 Data Links Manager (Solaris Operating Environment)

You can create a sample file for DB2 Data Links Manager. *Creating the sample file for DB2 Data Links Manager* is part of the larger task of *Creating a test environment on the DB2 Data Links server*.

Prerequisites:

Log on to the system as any user ID that is *not* a DB2 Data Links Manager Administrator.

Procedure:

To create a sample file:

1. Create a directory on the file system that is under the control of a Data Links Filesystem Filter (DLFF), to store files to be controlled by a DB2 server, by entering the following command:

   ```
   mkdir filesystem_name/directory_name
   ```

   where:

   - *filesystem_name* represents the name of the file system that is under the control of a DLFF.
   - *directory_name* represents the name of the directory that you want to create.

   The DB2 Data Links Manager Administrator should never be the owner of any files or directories that are in a file system under the control of a Data Links Filesystem Filter. Enter the following command to create the directory called `pictures` on the file system `/test`:

   ```
   mkdir /test/pictures
   ```

2. Change the permissions for the `pictures` directory that you just created so that any user ID can create a file in it by entering the following command:

   ```
   chmod 777 /test/pictures
   ```

3. Create a file called `psmith.bmp` in the `/test/pictures` directory, to be managed by the Data Links File Manager:

   ```
   echo "This is a picture of Paul Smith." > /test/pictures/psmith.bmp
   ```

4. Log out.

The sample file `psmith.bmp` is a text file, not a bitmap as the `.bmp` extension implies. For the purpose of verifying your installation, this file represents an employee's picture that will be inserted into a table that was defined with the DATALINKS data type.

You can now registering the Data Links server with the DB2 database.

Related tasks:

- "Registering the Data Links server with the DB2 database (Solaris Operating Environment)" on page 83
- "Authorizing a DB2 user ID to link a file (Solaris Operating Environment)" on page 82

Registering the Data Links server with the DB2 database (Solaris Operating Environment)

You can register the Data Links server with a DB2 database. *Registering the Data Links server with the DB2 database* is part of the larger task of *Verifying the installation of DB2 Data Links Manager*.

Prerequisites:

Log on to the DB2 server with a valid DB2 user ID that has System Administrative (SYSADM) authority on the VALIDATE instance that you created. By default, any user ID that belongs to the *Local Administrators* group has SYSADM authority on an instance.

Procedure:

To register the Data Links server with the remote DB2 UDB database where the DATALINK type column was defined earlier:

1. Enter the following command:

   ```
   db2 get instance
   ```

   This command should return the following output:

   ```
   The current database manager instance is:  VALIDATE
   ```

   If you do not receive this output, enter the following commands:

   ```
   set DB2INSTANCE=VALIDATE
   db2 get instance
   ```

2. Start the VALIDATE instance by entering the **db2start** command.
3. Register a Data Links server that will control the files that are linked by a DATALINK type column by entering the following command:

   ```
   db2 "add datalinks manager for database database_alias
       using node hostname port port_number"
   ```

   where:

   - *database_alias* represents the database alias name of the database.
   - *hostname* represents the fully qualified hostname of the Data Links server.
   - *port_number* represents the port number that you have reserved for communications between the Data Links server and the DB2 server. You specified this port number during the installation of DB2 Data Links Manager.

   For the example, enter the following command:

   ```
   db2 "add datalinks manager for database staff using node dlmserver.services.com port 50100"
   ```

4. Connect to the STAFF database by entering the following command:

   ```
   db2 connect to staff
   ```

5. Insert an entry into the EMPLOYEE table that you created by entering the following command:

   ```
   db2 "insert into employee values (001,'Paul','Smith',
      dlvalue('http://file_location/controlled_file'))"
   ```

   where:

   - *file_location* represents the fully qualified location of the file that is under the control of a Data Links Filesystem Filter on the Data Links server.
   - *controlled_file* represents the filename of the file that you want to control on the Data Links server.

   For the example, enter the following command

   ```
   db2 "insert into employee values (001,'Paul','Smith',
      dlvalue('http://dlmserver.services.com/test/pictures/psmith.bmp'))"
   ```

6. Log out.

Now you can verify the sample file is controlled by DLFF.

Related tasks:

- "Verifying the sample file is controlled by DLFF (Solaris Operating Environment)" on page 85
- "Creating the sample file for DB2 Data Links Manager (Solaris Operating Environment)" on page 82

Verifying the sample file is controlled by DLFF (Solaris Operating Environment)

Verifying the sample file is controlled by DLFF is part of the larger task of *Verifying the installation of DB2 Data Links Manager*.

Prerequisites:

Log on to the system as any user ID except as a user ID with root authority, or as the DB2 Data Links Manager Administrator.

Procedure:

To verify that the `psmith.bmp` sample file is under the control of the Data Links Filesystem Filter:

1. Enter:

   ```
   cat controlled_file
   ```

   where *controlled_file* represents the full pathname of the file that is controlled by the Data Links server.

   For the example, enter the following command:

   ```
   cat /test/pictures/psmith.bmp
   ```

   Note: We are using the **cat** command here because `psmith.bmp` is really a text file. Running the **cat** command on a true binary file would return unreadable output.

   If this file is being controlled by the Data Links File Manager, you will receive the following error:

   ```
   Cannot open /test/pictures/psmith.bmp
   ```

2. Log out.

Now you can verify the sample file is accessible.

Related tasks:

- "Creating a test environment on the DB2 Data Links server (Solaris Operating Environment)" on page 78
- "Verifying the sample file is accessible (Solaris Operating Environment)" on page 85

Verifying the sample file is accessible (Solaris Operating Environment)

Verifying the sample file is accessible is part of the larger task of *Verifying the installation of DB2 Data Links Manager*

Prerequisites:

Log on to the system with a valid DB2 user ID that has System Administrative (SYSADM) authority on the VALIDATE instance that you created. By default, any user ID that belongs to the primary group of the instance owner has SYSADM authority on an instance.

Procedure:

To verify that the psmith.bmp sample file can be accessed while it is under the control of the Data Links File Manager:

1. Run the db2profile or db2cshrc script as follows:

   ```
   . INSTHOME/sqllib/db2profile    (for bash, Bourne or Korn shell)
   source INSTHOME/sqllib/db2cshrc (for C shell)
   ```

   where *INSTHOME* represents the home directory of the instance owner.
2. Start the VALIDATE instance by entering the **db2start** command.
3. Connect to the STAFF database by entering the following command:

   ```
   db2 connect to staff
   ```
4. Select the controlled file by issuing an SQL SELECT statement.

   For the example, enter the following command:

   ```
   db2 "select dlurlpath(picture) from employee where lname = 'Smith'"
   ```

   This command returns the full pathname with an access token of the form:

   ```
   controlled_filepath/access_token;controlled_filename
   ```

   where:
   - *controlled_filepath* represents the fully qualified path of the controlled file.
   - *access_token* represents an encrypted key assigned by the database manager.
   - *controlled_filename* represents the name of the file that is under the control of a Data Links Filesystem Filter.

   For example, you will receive an access token that is similar to the following:

   ```
   /test/pictures/HVJ5NXGC0WQ.I5KKB6;psmith.bmp
   ```

   This access token will be used to read this file on the Data Links server.

   Note: By default, this access token is only valid for 60 seconds. This means that once you enter this command, you have only 60 seconds to complete the remaining steps in this section. You can increase the access token expiry time by updating the *dl_expint* database configuration parameter.

   To change the default expiration time for an access token to 10 minutes (the value is entered in seconds), enter the following commands:

   ```
   db2 update db cfg for staff using dl_expint 600
   db2 terminate
   db2 connect to staff
   ```

   If you change a setting for any database configuration parameter, you must always reconnect to the database for the changes to take effect.
5. Log out.

Now you can view the sample file.

Related tasks:

- "Verifying the sample file is controlled by DLFF (Solaris Operating Environment)" on page 85
- "Viewing the sample file (Solaris Operating Environment)" on page 87

Viewing the sample file (Solaris Operating Environment)

Viewing the sample file is part of the larger task of *Verifying the installation of DB2 Data Links Manager*. You will use the access token obtained in the previous step to view the `psmith.bmp` file.

Prerequisites:

Log on to the system as any user ID except as a user ID with root authority, or as the DB2 Data Links Manager Administrator.

Procedure:

To verify that you can access the file that is under the control of the Data Links File Manager:

1. Enter the following command:

   ```
   cat "/test/pictures/access_token;psmith.bmp"
   ```

   where *access_token* represents the encrypted key that you received in the previous step.

   You should receive the following output from this command:

   ```
   "This is a picture of Paul Smith."
   ```

If you did not receive an error, you have access to this file and you have installed and configured DB2 Data Links Manager correctly.

Related tasks:

- "Verifying the sample file is controlled by DLFF (Solaris Operating Environment)" on page 85
- "Verifying the sample file is accessible (Solaris Operating Environment)" on page 85

Applying a FixPak for Data Links Manager on Solaris Operating Environments

To apply the Data Links Manager FixPak on Solaris Operating Environments:

1. As the DB2 Data Links Manager Administrator, bring down the DB2 Data Links Manager by running the following commands:

   ```
   dlfm stop
   dlfm stopdbm
   ```

   Ensure that there are no DB2 or DLFM processes remaining.
2. As root, unmount each dlfs filesystem (filesystems controlled by the DB2 Data Links Manager) by running the following command:

   ```
   umount /filesystem_name
   ```

   where `/filesystem_name` represents the name of the dlfs filesystem which you want to unmount.

3. As root, unload the DLFS device driver by running the following command:
   ```
   rem_drv dlfsdrv
   ```
4. Install the FixPak.
5. After successful installation of the FixPak, as root, update the Data Links Manager instance by running the following command:
   ```
   /opt/IBMdb2/V8.1/instance/dlfmupdt dlm_instance_name
   ```

   where `dlm_instance_name` represents the name of the DB2 Data Links Manager Administrator.
6. As root, load the DLFS device driver by running the following command:
   ```
   add_drv -m '* 0777 dlfm dlfmgrp' dlfsdrv
   ```
7. As root, mount each of the DLFS filesystems by running the following command:
   ```
   mount -v dlfs /filesystem_name
   ```
8. As the DB2 Data Links Manager Administrator, run the following commands to bring up the DB2 Data Links Manager:
   ```
   dlfm bind
   dlfm start
   ```

Related concepts:

- "Before you install DB2 Data Links Manager (Solaris Operating Environment)" on page 63

Related reference:

- "What's new in DB2 Data Links Manager Version 8" on page 1

Chapter 5. Uninstalling Data Links Manager

This topic describes how to uninstall Data Links Manager from your computer. You do not have to uninstall Data Links Manager to install a new version.

This procedure is not required for Windows operating system. See the related links section at the end of this topic for more information.

Prerequisites:

Log in as a user ID with root authority.

Procedure:

To uninstall Data Links Manager:

1. For AIX or Solaris Operating Environment:
   a. Determine the DLFS partitions you have by entering the following command:

      ```
      run mount | grep dlfs
      ```

   b. Convert your DLFS partitions back to JFS (for AIX) or UFS (for Solaris Operating Environment) by entering one of the following commands:
      - For AIX, enter the following command:

        ```
        /usr/opt/db2_08_01/instance/dlfmfsmd -j mountpoint
        ```

      - For Solaris Operating Environments enter the following command:

        ```
        /opt/IBM/db2/V8.1/instance/dlfmfsmd -j mountpoint
        ```

      where *mountpoint* represents the mount point of the DLFS.
2. Uninstall DB2.

Related tasks:

- "Uninstalling DB2 UDB (Windows)" in the *Quick Beginnings for DB2 Servers*
- "Uninstalling DB2 UDB (UNIX)" in the *Quick Beginnings for DB2 Servers*

Appendix A. DB2 Universal Database technical information

DB2 documentation and help

DB2® technical information is available through the following tools and methods:

- DB2 Information Center
  - Topics
  - Help for DB2 tools
  - Sample programs
  - Tutorials
- Downloadable PDF files, PDF files on CD, and printed books
  - Guides
  - Reference manuals
- Command line help
  - Command help
  - Message help
  - SQL state help
- Installed source code
  - Sample programs

You can access additional DB2 Universal Database™ technical information such as technotes, white papers, and Redbooks™ online at ibm.com®. Access the DB2 Information Management software library site at www.ibm.com/software/data/pubs/.

DB2 documentation updates

IBM® may periodically make documentation FixPaks and other documentation updates to the DB2 Information Center available. If you access the DB2 Information Center at http://publib.boulder.ibm.com/infocenter/db2help/, you will always be viewing the most up-to-date information. If you have installed the DB2 Information Center locally, then you need to install any updates manually before you can view them. Documentation updates allow you to update the information that you installed from the *DB2 Information Center CD* when new information becomes available.

The Information Center is updated more frequently than either the PDF or the hardcopy books. To get the most current DB2 technical information, install the documentation updates as they become available or go to the DB2 Information Center at the www.ibm.com site.

Related tasks:

- "Invoking contextual help from a DB2 tool" on page 108

Related reference:

- "DB2 PDF and printed documentation" on page 102

DB2 Information Center

The DB2® Information Center gives you access to all of the information you need to take full advantage of DB2 family products, including DB2 Universal Database™, DB2 Connect™, DB2 Information Integrator and DB2 Query Patroller™. The DB2 Information Center also contains information for major DB2 features and components including replication, data warehousing, and the DB2 extenders.

The DB2 Information Center has the following features if you view it in Mozilla 1.0 or later or Microsoft® Internet Explorer 5.5 or later. Some features require you to enable support for JavaScript™:

Flexible installation options

You can choose to view the DB2 documentation using the option that best meets your needs:

- To effortlessly ensure that your documentation is always up to date, you can access all of your documentation directly from the DB2 Information Center hosted on the IBM® Web site at http://publib.boulder.ibm.com/infocenter/db2help/
- To minimize your update efforts and keep your network traffic within your intranet, you can install the DB2 documentation on a single server on your intranet
- To maximize your flexibility and reduce your dependence on network connections, you can install the DB2 documentation on your own computer

Search

You can search all of the topics in the DB2 Information Center by entering a search term in the **Search** text field. You can retrieve exact matches by enclosing terms in quotation marks, and you can refine your search with wildcard operators (*, ?) and Boolean operators (AND, NOT, OR).

Task-oriented table of contents

You can locate topics in the DB2 documentation from a single table of contents. The table of contents is organized primarily by the kind of tasks you may want to perform, but also includes entries for product overviews, goals, reference information, an index, and a glossary.

- Product overviews describe the relationship between the available products in the DB2 family, the features offered by each of those products, and up to date release information for each of these products.
- Goal categories such as installing, administering, and developing include topics that enable you to quickly complete tasks and develop a deeper understanding of the background information for completing those tasks.
- Reference topics provide detailed information about a subject, including statement and command syntax, message help, and configuration parameters.

Show current topic in table of contents

You can show where the current topic fits into the table of contents by clicking the **Refresh / Show Current Topic** button in the table of contents frame or by clicking the **Show in Table of Contents** button in the content frame. This feature is helpful if you have followed several links to related topics in several files or arrived at a topic from search results.

Index You can access all of the documentation from the index. The index is organized in alphabetical order by index term.

Glossary
You can use the glossary to look up definitions of terms used in the DB2 documentation. The glossary is organized in alphabetical order by glossary term.

Integrated localized information
The DB2 Information Center displays information in the preferred language set in your browser preferences. If a topic is not available in your preferred language, the DB2 Information Center displays the English version of that topic.

For iSeries™ technical information, refer to the IBM eServer™ iSeries information center at www.ibm.com/eserver/iseries/infocenter/.

Related concepts:

- "DB2 Information Center installation scenarios" on page 93

Related tasks:

- "Updating the DB2 Information Center installed on your computer or intranet server" on page 101
- "Displaying topics in your preferred language in the DB2 Information Center" on page 101
- "Invoking the DB2 Information Center" on page 100
- "Installing the DB2 Information Center using the DB2 Setup wizard (UNIX)" on page 95
- "Installing the DB2 Information Center using the DB2 Setup wizard (Windows)" on page 98

DB2 Information Center installation scenarios

Different working environments can pose different requirements for how to access DB2® information. The DB2 Information Center can be accessed on the IBM® Web site, on a server on your organization's network, or on a version installed on your computer. In all three cases, the documentation is contained in the DB2 Information Center, which is an architected web of topic-based information that you view with a browser. By default, DB2 products access the DB2 Information Center on the IBM Web site. However, if you want to access the DB2 Information Center on an intranet server or on your own computer, you must install the DB2 Information Center using the DB2 Information Center CD found in your product Media Pack. Refer to the summary of options for accessing DB2 documentation which follows, along with the three installation scenarios, to help determine which method of accessing the DB2 Information Center works best for you and your work environment, and what installation issues you might need to consider.

Summary of options for accessing DB2 documentation:

The following table provides recommendations on which options are possible in your work environment for accessing the DB2 product documentation in the DB2 Information Center.

Internet access	Intranet access	Recommendation
Yes	Yes	Access the DB2 Information Center on the IBM Web site, or access the DB2 Information Center installed on an intranet server.
Yes	No	Access the DB2 Information Center on the IBM Web site.
No	Yes	Access the DB2 Information Center installed on an intranet server.
No	No	Access the DB2 Information Center on a local computer.

Scenario: Accessing the DB2 Information Center on your computer:

Tsu-Chen owns a factory in a small town that does not have a local ISP to provide him with Internet access. He purchased DB2 Universal Database™ to manage his inventory, his product orders, his banking account information, and his business expenses. Never having used a DB2 product before, Tsu-Chen needs to learn how to do so from the DB2 product documentation.

After installing DB2 Universal Database on his computer using the typical installation option, Tsu-Chen tries to access the DB2 documentation. However, his browser gives him an error message that the page he tried to open cannot be found. Tsu-Chen checks the installation manual for his DB2 product and discovers that he has to install the DB2 Information Center if he wants to access DB2 documentation on his computer. He finds the *DB2 Information Center CD* in the media pack and installs it.

From the application launcher for his operating system, Tsu-Chen now has access to the DB2 Information Center and can learn how to use his DB2 product to increase the success of his business.

Scenario: Accessing the DB2 Information Center on the IBM Web site:

Colin is an information technology consultant with a training firm. He specializes in database technology and SQL and gives seminars on these subjects to businesses all over North America using DB2 Universal Database. Part of Colin's seminars includes using DB2 documentation as a teaching tool. For example, while teaching courses on SQL, Colin uses the DB2 documentation on SQL as a way to teach basic and advanced syntax for database queries.

Most of the businesses at which Colin teaches have Internet access. This situation influenced Colin's decision to configure his mobile computer to access the DB2 Information Center on the IBM Web site when he installed the latest version of DB2 Universal Database. This configuration allows Colin to have online access to the latest DB2 documentation during his seminars.

However, sometimes while travelling Colin does not have Internet access. This posed a problem for him, especially when he needed to access to DB2 documentation to prepare for seminars. To avoid situations like this, Colin installed a copy of the DB2 Information Center on his mobile computer.

Colin enjoys the flexibility of always having a copy of DB2 documentation at his disposal. Using the **db2set** command, he can easily configure the registry variables

on his mobile computer to access the DB2 Information Center on either the IBM Web site, or his mobile computer, depending on his situation.

Scenario: Accessing the DB2 Information Center on an intranet server:

Eva works as a senior database administrator for a life insurance company. Her administration responsibilities include installing and configuring the latest version of DB2 Universal Database on the company's UNIX® database servers. Her company recently informed its employees that, for security reasons, it would not provide them with Internet access at work. Because her company has a networked environment, Eva decides to install a copy of the DB2 Information Center on an intranet server so that all employees in the company who use the company's data warehouse on a regular basis (sales representatives, sales managers, and business analysts) have access to DB2 documentation.

Eva instructs her database team to install the latest version of DB2 Universal Database on all of the employee's computers using a response file, to ensure that each computer is configured to access the DB2 Information Center using the host name and the port number of the intranet server.

However, through a misunderstanding Migual, a junior database administrator on Eva's team, installs a copy of the DB2 Information Center on several of the employee computers, rather than configuring DB2 Universal Database to access the DB2 Information Center on the intranet server. To correct this situation Eva tells Migual to use the **db2set** command to change the DB2 Information Center registry variables (DB2_DOCHOST for the host name, and DB2_DOCPORT for the port number) on each of these computers. Now all of the appropriate computers on the network have access to the DB2 Information Center, and employees can find answers to their DB2 questions in the DB2 documentation.

Related concepts:

- "DB2 Information Center" on page 92

Related tasks:

- "Updating the DB2 Information Center installed on your computer or intranet server" on page 101
- "Installing the DB2 Information Center using the DB2 Setup wizard (UNIX)" on page 95
- "Installing the DB2 Information Center using the DB2 Setup wizard (Windows)" on page 98

Related reference:

- "db2set - DB2 Profile Registry Command" in the *Command Reference*

Installing the DB2 Information Center using the DB2 Setup wizard (UNIX)

DB2 product documentation can be accessed in three ways: on the IBM Web site, on an intranet server, or on a version installed on your computer. By default, DB2 products access DB2 documentation on the IBM Web site. If you want to access the DB2 documentation on an intranet server or on your own computer, you must install the documentation from the *DB2 Information Center CD*. Using the DB2 Setup wizard, you can define your installation preferences and install the DB2 Information Center on a computer that uses a UNIX operating system.

Prerequisites:

This section lists the hardware, operating system, software, and communication requirements for installing the DB2 Information Center on UNIX computers.

- **Hardware requirements**

  You require one of the following processors:
  - PowerPC (AIX)
  - HP 9000 (HP-UX)
  - Intel 32–bit (Linux)
  - Solaris UltraSPARC computers (Solaris Operating Environment)
- **Operating system requirements**

  You require one of the following operating systems:
  - IBM AIX 5.1 (on PowerPC)
  - HP-UX 11i (on HP 9000)
  - Red Hat Linux 8.0 (on Intel 32–bit)
  - SuSE Linux 8.1 (on Intel 32–bit)
  - Sun Solaris Version 8 (on Solaris Operating Environment UltraSPARC computers)

  Note: The DB2 Information Center runs on a subset of the UNIX operating systems on which DB2 clients are supported. It is therefore recommended that you either access the DB2 Information Center from the IBM Web site, or that you install and access the DB2 Information Center on an intranet server.
- **Software requirements**
  - The following browser is supported:
    - Mozilla Version 1.0 or greater
- The DB2 Setup wizard is a graphical installer. You must have an implementation of the X Window System software capable of rendering a graphical user interface for the DB2 Setup wizard to run on your computer. Before you can run the DB2 Setup wizard you must ensure that you have properly exported your display. For example, enter the following command at the command prompt:

  ```
  export DISPLAY=9.26.163.144:0.
  ```
- **Communication requirements**
  - TCP/IP

Procedure:

To install the DB2 Information Center using the DB2 Setup wizard:

1. Log on to the system.
2. Insert and mount the DB2 Information Center product CD on your system.
3. Change to the directory where the CD is mounted by entering the following command:

   ```
   cd /cd
   ```

   where */cd* represents the mount point of the CD.
4. Enter the **./db2setup** command to start the DB2 Setup wizard.
5. The IBM DB2 Setup Launchpad opens. To proceed directly to the installation of the DB2 Information Center, click **Install Product**. Online help is available

to guide you through the remaining steps. To invoke the online help, click **Help**. You can click **Cancel** at any time to end the installation.

6. On the **Select the product you would like to install** page, click **Next**.
7. Click **Next** on the **Welcome to the DB2 Setup wizard** page. The DB2 Setup wizard will guide you through the program setup process.
8. To proceed with the installation, you must accept the license agreement. On the **License Agreement** page, select **I accept the terms in the license agreement** and click **Next**.
9. Select **Install DB2 Information Center on this computer** on the **Select the installation action** page. If you want to use a response file to install the DB2 Information Center on this or other computers at a later time, select **Save your settings in a response file**. Click **Next**.
10. Select the languages in which the DB2 Information Center will be installed on **Select the languages to install** page. Click **Next**.
11. Configure the DB2 Information Center for incoming communication on the **Specify the DB2 Information Center port** page. Click **Next** to continue the installation.
12. Review the installation choices you have made in the **Start copying files** page. To change any settings, click **Back**. Click **Install** to copy the DB2 Information Center files onto your computer.

You can also install the DB2 Information Center using a response file.

The installation logs `db2setup.his`, `db2setup.log`, and `db2setup.err` are located, by default, in the `/tmp` directory.

The `db2setup.log` file captures all DB2 product installation information, including errors. The `db2setup.his` file records all DB2 product installations on your computer. DB2 appends the `db2setup.log` file to the `db2setup.his` file. The `db2setup.err` file captures any error output that is returned by Java, for example, exceptions and trap information.

When the installation is complete, the DB2 Information Center will be installed in one of the following directories, depending upon your UNIX operating system:

- AIX: /usr/opt/db2_08_01
- HP-UX: /opt/IBM/db2/V8.1
- Linux: /opt/IBM/db2/V8.1
- Solaris Operating Environment: /opt/IBM/db2/V8.1

Related concepts:

- "DB2 Information Center installation scenarios" on page 93

Related tasks:

- "Displaying topics in your preferred language in the DB2 Information Center" on page 101
- "Installing the DB2 Information Center using the DB2 Setup wizard (Windows)" on page 98

Installing the DB2 Information Center using the DB2 Setup wizard (Windows)

DB2 product documentation can be accessed in three ways: on the IBM Web site, on an intranet server, or on a version installed on your computer. By default, DB2 products access DB2 documentation on the IBM Web site. If you want to access the DB2 documentation on an intranet server or on your own computer, you must install the DB2 documentation from the *DB2 Information Center CD*. Using the DB2 Setup wizard, you can define your installation preferences and install the DB2 Information Center on a computer that uses a Windows operating system.

Prerequisites:

This section lists the hardware, operating system, software, and communication requirements for installing the DB2 Information Center on Windows.

- **Hardware requirements**

  You require one of the following processors:

  – 32-bit computers: a Pentium or Pentium compatible CPU
- **Operating system requirements**

  You require one of the following operating systems:

  – Windows 2000

  – Windows XP

  Note: The DB2 Information Center runs on a subset of the Windows operating systems on which DB2 clients are supported. It is therefore recommended that you either access the DB2 Information Center on the IBM Web site, or that you install and access the DB2 Information Center on an intranet server.
- **Software requirements**

  – The following browsers are supported:

    - Mozilla 1.0 or greater

    - Internet Explorer Version 5.5 or 6.0 (Version 6.0 for Windows XP)
- **Communication requirements**

  – TCP/IP

Restrictions:

- You require an account with administrative privileges to install the DB2 Information Center.

Procedure:

To install the DB2 Information Center using the DB2 Setup wizard:

1. Log on to the system with the account that you have defined for the DB2 Information Center installation.
2. Insert the CD into the drive. If enabled, the auto-run feature starts the IBM DB2 Setup Launchpad.
3. The DB2 Setup wizard determines the system language and launches the setup program for that language. If you want to run the setup program in a language other than English, or the setup program fails to auto-start, you can start the DB2 Setup wizard manually.

To start the DB2 Setup wizard manually:

a. Click **Start** and select **Run**.
b. In the **Open** field, type the following command:

```
x:\setup.exe /i 2-letter language identifier
```

where *x:* represents your CD drive, and *2-letter language identifier* represents the language in which the setup program will be run.

c. Click **OK**.

4. The IBM DB2 Setup Launchpad opens. To proceed directly to the installation of the DB2 Information Center, click **Install Product**. Online help is available to guide you through the remaining steps. To invoke the online help, click **Help**. You can click **Cancel** at any time to end the installation.
5. On the **Select the product you would like to install** page, click **Next**.
6. Click **Next** on the **Welcome to the DB2 Setup wizard** page. The DB2 Setup wizard will guide you through the program setup process.
7. To proceed with the installation, you must accept the license agreement. On the **License Agreement** page, select **I accept the terms in the license agreement** and click **Next**.
8. Select **Install DB2 Information Center on this computer** on the **Select the installation action** page. If you want to use a response file to install the DB2 Information Center on this or other computers at a later time, select **Save your settings in a response file**. Click **Next**.
9. Select the languages in which the DB2 Information Center will be installed on **Select the languages to install** page. Click **Next**.
10. Configure the DB2 Information Center for incoming communication on the **Specify the DB2 Information Center port** page. Click **Next** to continue the installation.
11. Review the installation choices you have made in the **Start copying files** page. To change any settings, click **Back**. Click **Install** to copy the DB2 Information Center files onto your computer.

You can install the DB2 Information Center using a response file. You can also use the **db2rspgn** command to generate a response file based on an existing installation.

For information on errors encountered during installation, see the `db2.log` and `db2wi.log` files located in the `'My Documents'\DB2LOG\` directory. The location of the `'My Documents'` directory will depend on the settings on your computer.

The `db2wi.log` file captures the most recent DB2 installation information. The `db2.log` captures the history of DB2 product installations.

Related concepts:

- "DB2 Information Center installation scenarios" on page 93

Related tasks:

- "Displaying topics in your preferred language in the DB2 Information Center" on page 101
- "Installing the DB2 Information Center using the DB2 Setup wizard (UNIX)" on page 95

Invoking the DB2 Information Center

The DB2 Information Center gives you access to all of the information that you need to use DB2 products for Linux, UNIX, and Windows operating systems such as DB2 Universal Database, DB2 Connect, DB2 Information Integrator, and DB2 Query Patroller.

You can invoke the DB2 Information Center from one of the following places:

- Computers on which a DB2 UDB client or server is installed
- An intranet server or local computer on which the DB2 Information Center installed
- The IBM Web site

Prerequisites:

Before you invoke the DB2 Information Center:

- *Optional*: Configure your browser to display topics in your preferred language
- *Optional*: Configure your DB2 client to use the DB2 Information Center installed on your computer or intranet server

Procedure:

To invoke the DB2 Information Center on a computer on which a DB2 UDB client or server is installed:

- From the Start Menu (Windows operating system): Click **Start → Programs → IBM DB2 → Information → Information Center**.
- From the command line prompt:
  - For Linux and UNIX operating systems, issue the **db2icdocs** command.
  - For the Windows operating system, issue the **db2icdocs.exe** command.

To open the DB2 Information Center installed on an intranet server or local computer in a Web browser:

- Open the Web page at http://<host-name>:<port-number>/, where <host-name> represents the host name and <port-number> represents the port number on which the DB2 Information Center is available.

To open the DB2 Information Center on the IBM Web site in a Web browser:

- Open the Web page at publib.boulder.ibm.com/infocenter/db2help/.

Related concepts:

- "DB2 Information Center" on page 92

Related tasks:

- "Displaying topics in your preferred language in the DB2 Information Center" on page 101
- "Invoking contextual help from a DB2 tool" on page 108
- "Updating the DB2 Information Center installed on your computer or intranet server" on page 101
- "Invoking message help from the command line processor" on page 109
- "Invoking command help from the command line processor" on page 110
- "Invoking SQL state help from the command line processor" on page 110

Updating the DB2 Information Center installed on your computer or intranet server

The DB2 Information Center available from http://publib.boulder.ibm.com/infocenter/db2help/ will be periodically updated with new or changed documentation. IBM may also make DB2 Information Center updates available to download and install on your computer or intranet server. Updating the DB2 Information Center does not update DB2 client or server products.

Prerequisites:

You must have access to a computer that is connected to the Internet.

Procedure:

To update the DB2 Information Center installed on your computer or intranet server:

1. Open the DB2 Information Center hosted on the IBM Web site at: http://publib.boulder.ibm.com/infocenter/db2help/
2. In the Downloads section of the welcome page under the Service and Support heading, click the **DB2 Universal Database documentation** link.
3. Determine if the version of your DB2 Information Center is out of date by comparing the latest refreshed documentation image level to the documentation level you have installed. The documentation level you have installed is listed on the DB2 Information Center welcome page.
4. If a more recent version of the DB2 Information Center is available, download the latest refreshed *DB2 Information Center* image applicable to your operating system.
5. To install the refreshed *DB2 Information Center* image, follow the instructions provided on the Web page.

Related concepts:

- "DB2 Information Center installation scenarios" on page 93

Related tasks:

- "Invoking the DB2 Information Center" on page 100
- "Installing the DB2 Information Center using the DB2 Setup wizard (UNIX)" on page 95
- "Installing the DB2 Information Center using the DB2 Setup wizard (Windows)" on page 98

Displaying topics in your preferred language in the DB2 Information Center

The DB2 Information Center attempts to display topics in the language specified in your browser preferences. If a topic has not been translated into your preferred language, the DB2 Information Center displays the topic in English.

Procedure:

To display topics in your preferred language in the Internet Explorer browser:

1. In Internet Explorer, click the **Tools** —> **Internet Options** —> **Languages...** button. The Language Preferences window opens.
2. Ensure your preferred language is specified as the first entry in the list of languages.
   - To add a new language to the list, click the **Add...** button.

     Note: Adding a language does not guarantee that the computer has the fonts required to display the topics in the preferred language.
   - To move a language to the top of the list, select the language and click the **Move Up** button until the language is first in the list of languages.
3. Refresh the page to display the DB2 Information Center in your preferred language.

To display topics in your preferred language in the Mozilla browser:

1. In Mozilla, select the **Edit** —> **Preferences** —> **Languages** button. The Languages panel is displayed in the Preferences window.
2. Ensure your preferred language is specified as the first entry in the list of languages.
   - To add a new language to the list, click the **Add...** button to select a language from the Add Languages window.
   - To move a language to the top of the list, select the language and click the **Move Up** button until the language is first in the list of languages.
3. Refresh the page to display the DB2 Information Center in your preferred language.

DB2 PDF and printed documentation

The following tables provide official book names, form numbers, and PDF file names. To order hardcopy books, you must know the official book name. To print a PDF file, you must know the PDF file name.

The DB2 documentation is categorized by the following headings:

- Core DB2 information
- Administration information
- Application development information
- Business intelligence information
- DB2 Connect information
- Getting started information
- Tutorial information
- Optional component information
- Release notes

The following tables describe, for each book in the DB2 library, the information needed to order the hard copy, or to print or view the PDF for that book. A full description of each of the books in the DB2 library is available from the IBM Publications Center at www.ibm.com/shop/publications/order

Core DB2 information

The information in these books is fundamental to all DB2 users; you will find this information useful whether you are a programmer, a database administrator, or someone who works with DB2 Connect, DB2 Warehouse Manager, or other DB2

products.

Table 3. Core DB2 information

Name	Form Number	PDF File Name
IBM DB2 Universal Database Command Reference	SC09-4828	db2n0x81
IBM DB2 Universal Database Glossary	No form number	db2t0x81
IBM DB2 Universal Database Message Reference, Volume 1	GC09-4840, not available in hardcopy	db2m1x81
IBM DB2 Universal Database Message Reference, Volume 2	GC09-4841, not available in hardcopy	db2m2x81
IBM DB2 Universal Database What's New	SC09-4848	db2q0x81

Administration information

The information in these books covers those topics required to effectively design, implement, and maintain DB2 databases, data warehouses, and federated systems.

Table 4. Administration information

Name	Form number	PDF file name
IBM DB2 Universal Database Administration Guide: Planning	SC09-4822	db2d1x81
IBM DB2 Universal Database Administration Guide: Implementation	SC09-4820	db2d2x81
IBM DB2 Universal Database Administration Guide: Performance	SC09-4821	db2d3x81
IBM DB2 Universal Database Administrative API Reference	SC09-4824	db2b0x81
IBM DB2 Universal Database Data Movement Utilities Guide and Reference	SC09-4830	db2dmx81
IBM DB2 Universal Database Data Recovery and High Availability Guide and Reference	SC09-4831	db2hax81
IBM DB2 Universal Database Data Warehouse Center Administration Guide	SC27-1123	db2ddx81
IBM DB2 Universal Database SQL Reference, Volume 1	SC09-4844	db2s1x81
IBM DB2 Universal Database SQL Reference, Volume 2	SC09-4845	db2s2x81
IBM DB2 Universal Database System Monitor Guide and Reference	SC09-4847	db2f0x81

Application development information

The information in these books is of special interest to application developers or programmers working with DB2 Universal Database (DB2 UDB). You will find information about supported languages and compilers, as well as the documentation required to access DB2 UDB using the various supported programming interfaces, such as embedded SQL, ODBC, JDBC, SQLJ, and CLI. If you are using the DB2 Information Center, you can also access HTML versions of the source code for the sample programs.

Table 5. Application development information

Name	Form number	PDF file name
IBM DB2 Universal Database Application Development Guide: Building and Running Applications	SC09-4825	db2axx81
IBM DB2 Universal Database Application Development Guide: Programming Client Applications	SC09-4826	db2a1x81
IBM DB2 Universal Database Application Development Guide: Programming Server Applications	SC09-4827	db2a2x81
IBM DB2 Universal Database Call Level Interface Guide and Reference, Volume 1	SC09-4849	db2l1x81
IBM DB2 Universal Database Call Level Interface Guide and Reference, Volume 2	SC09-4850	db2l2x81
IBM DB2 Universal Database Data Warehouse Center Application Integration Guide	SC27-1124	db2adx81
IBM DB2 XML Extender Administration and Programming	SC27-1234	db2sxx81

Business intelligence information

The information in these books describes how to use components that enhance the data warehousing and analytical capabilities of DB2 Universal Database.

Table 6. Business intelligence information

Name	Form number	PDF file name
IBM DB2 Warehouse Manager Standard Edition Information Catalog Center Administration Guide	SC27-1125	db2dix81
IBM DB2 Warehouse Manager Standard Edition Installation Guide	GC27-1122	db2idx81
IBM DB2 Warehouse Manager Standard Edition Managing ETI Solution Conversion Programs with DB2 Warehouse Manager	SC18-7727	iwhe1mstx80

DB2 Connect information

The information in this category describes how to access data on mainframe and midrange servers using DB2 Connect Enterprise Edition or DB2 Connect Personal Edition.

Table 7. DB2 Connect information

Name	Form number	PDF file name
IBM Connectivity Supplement	No form number	db2h1x81
IBM DB2 Connect Quick Beginnings for DB2 Connect Enterprise Edition	GC09-4833	db2c6x81
IBM DB2 Connect Quick Beginnings for DB2 Connect Personal Edition	GC09-4834	db2c1x81
IBM DB2 Connect User's Guide	SC09-4835	db2c0x81

Getting started information

The information in this category is useful when you are installing and configuring servers, clients, and other DB2 products.

Table 8. Getting started information

Name	Form number	PDF file name
IBM DB2 Universal Database Quick Beginnings for DB2 Clients	GC09-4832, not available in hardcopy	db2itx81
IBM DB2 Universal Database Quick Beginnings for DB2 Servers	GC09-4836	db2isx81
IBM DB2 Universal Database Quick Beginnings for DB2 Personal Edition	GC09-4838	db2i1x81
IBM DB2 Universal Database Installation and Configuration Supplement	GC09-4837, not available in hardcopy	db2iyx81
IBM DB2 Universal Database Quick Beginnings for DB2 Data Links Manager	GC09-4829	db2z6x81

Tutorial information

Tutorial information introduces DB2 features and teaches how to perform various tasks.

Table 9. Tutorial information

Name	Form number	PDF file name
Business Intelligence Tutorial: Introduction to the Data Warehouse	No form number	db2tux81
Business Intelligence Tutorial: Extended Lessons in Data Warehousing	No form number	db2tax81

Table 9. Tutorial information (continued)

Name	Form number	PDF file name
Information Catalog Center Tutorial	No form number	db2aix81
Video Central for e-business Tutorial	No form number	db2twx81
Visual Explain Tutorial	No form number	db2tvx81

Optional component information

The information in this category describes how to work with optional DB2 components.

Table 10. Optional component information

Name	Form number	PDF file name
IBM DB2 Cube Views Guide and Reference	SC18–7298	db2aax81
IBM DB2 Query Patroller Guide: Installation, Administration and Usage Guide	GC09–7658	db2dwx81
IBM DB2 Spatial Extender and Geodetic Extender User's Guide and Reference	SC27-1226	db2sbx81
IBM DB2 Universal Database Data Links Manager Administration Guide and Reference	SC27-1221	db2z0x82
DB2 Net Search Extender Administration and User's Guide **Note:** HTML for this document is *not* installed from the HTML documentation CD.	SH12-6740	N/A

Release notes

The release notes provide additional information specific to your product's release and FixPak level. The release notes also provide summaries of the documentation updates incorporated in each release, update, and FixPak.

Table 11. Release notes

Name	Form number	PDF file name
DB2 Release Notes	See note.	See note.
DB2 Installation Notes	Available on product CD-ROM only.	Not available.

Note: The Release Notes are available in:

- XHTML and Text format, on the product CDs
- PDF format, on the PDF Documentation CD

In addition the portions of the Release Notes that discuss *Known Problems and Workarounds* and *Incompatibilities Between Releases* also appear in the DB2 Information Center.

To view the Release Notes in text format on UNIX-based platforms, see the `Release.Notes` file. This file is located in the `DB2DIR/Readme/%L` directory, where `%L` represents the locale name and `DB2DIR` represents:

- For AIX operating systems: `/usr/opt/db2_08_01`
- For all other UNIX-based operating systems: `/opt/IBM/db2/V8.1`

Related concepts:

- "DB2 documentation and help" on page 91

Related tasks:

- "Printing DB2 books from PDF files" on page 107
- "Ordering printed DB2 books" on page 108
- "Invoking contextual help from a DB2 tool" on page 108

Printing DB2 books from PDF files

You can print DB2 books from the PDF files on the *DB2 PDF Documentation* CD. Using Adobe Acrobat Reader, you can print either the entire book or a specific range of pages.

Prerequisites:

Ensure that you have Adobe Acrobat Reader installed. If you need to install Adobe Acrobat Reader, it is available from the Adobe Web site at www.adobe.com

Procedure:

To print a DB2 book from a PDF file:

1. Insert the *DB2 PDF Documentation* CD. On UNIX operating systems, mount the DB2 PDF Documentation CD. Refer to your *Quick Beginnings* book for details on how to mount a CD on UNIX operating systems.
2. Open index.htm. The file opens in a browser window.
3. Click on the title of the PDF you want to see. The PDF will open in Acrobat Reader.
4. Select **File → Print** to print any portions of the book that you want.

Related concepts:

- "DB2 Information Center" on page 92

Related tasks:

- "Mounting the CD-ROM (AIX)" in the *Quick Beginnings for DB2 Servers*
- "Mounting the CD-ROM (HP-UX)" in the *Quick Beginnings for DB2 Servers*
- "Mounting the CD-ROM (Linux)" in the *Quick Beginnings for DB2 Servers*
- "Ordering printed DB2 books" on page 108
- "Mounting the CD-ROM (Solaris Operating Environment)" in the *Quick Beginnings for DB2 Servers*

Related reference:

- "DB2 PDF and printed documentation" on page 102

Ordering printed DB2 books

If you prefer to use hardcopy books, you can order them in one of three ways.

Procedure:

Printed books can be ordered in some countries or regions. Check the IBM Publications website for your country or region to see if this service is available in your country or region. When the publications are available for ordering, you can:

- Contact your IBM authorized dealer or marketing representative. To find a local IBM representative, check the IBM Worldwide Directory of Contacts at www.ibm.com/planetwide
- Phone `1-800-879-2755` in the United States or `1-800-IBM-4YOU` in Canada.
- Visit the IBM Publications Center at http://www.ibm.com/shop/publications/order. The ability to order books from the IBM Publications Center may not be available in all countries.

At the time the DB2 product becomes available, the printed books are the same as those that are available in PDF format on the *DB2 PDF Documentation CD*. Content in the printed books that appears in the *DB2 Information Center CD* is also the same. However, there is some additional content available in DB2 Information Center CD that does not appear anywhere in the PDF books (for example, SQL Administration routines and HTML samples). Not all books available on the DB2 PDF Documentation CD are available for ordering in hardcopy.

Note: The DB2 Information Center is updated more frequently than either the PDF or the hardcopy books; install documentation updates as they become available or refer to the DB2 Information Center at http://publib.boulder.ibm.com/infocenter/db2help/ to get the most current information.

Related tasks:

- "Printing DB2 books from PDF files" on page 107

Related reference:

- "DB2 PDF and printed documentation" on page 102

Invoking contextual help from a DB2 tool

Contextual help provides information about the tasks or controls that are associated with a particular window, notebook, wizard, or advisor. Contextual help is available from DB2 administration and development tools that have graphical user interfaces. There are two types of contextual help:

- Help accessed through the **Help** button that is located on each window or notebook
- Infopops, which are pop-up information windows displayed when the mouse cursor is placed over a field or control, or when a field or control is selected in a window, notebook, wizard, or advisor and F1 is pressed.

The **Help** button gives you access to overview, prerequisite, and task information. The infopops describe the individual fields and controls.

Procedure:

To invoke contextual help:

- For window and notebook help, start one of the DB2 tools, then open any window or notebook. Click the **Help** button at the bottom right corner of the window or notebook to invoke the contextual help.

  You can also access the contextual help from the **Help** menu item at the top of each of the DB2 tools centers.

  Within wizards and advisors, click on the Task Overview link on the first page to view contextual help.
- For infopop help about individual controls on a window or notebook, click the control, then click **F1**. Pop-up information containing details about the control is displayed in a yellow window.

  Note: To display infopops simply by holding the mouse cursor over a field or control, select the **Automatically display infopops** check box on the **Documentation** page of the Tool Settings notebook.

  Similar to infopops, diagnosis pop-up information is another form of context-sensitive help; they contain data entry rules. Diagnosis pop-up information is displayed in a purple window that appears when data that is not valid or that is insufficient is entered. Diagnosis pop-up information can appear for:

  – Compulsory fields.

  – Fields whose data follows a precise format, such as a date field.

Related tasks:

- "Invoking the DB2 Information Center" on page 100
- "Invoking message help from the command line processor" on page 109
- "Invoking command help from the command line processor" on page 110
- "Invoking SQL state help from the command line processor" on page 110

Invoking message help from the command line processor

Message help describes the cause of a message and describes any action you should take in response to the error.

Procedure:

To invoke message help, open the command line processor and enter:

```
? XXXnnnnn
```

where *XXXnnnnn* represents a valid message identifier.

For example, `? SQL30081` displays help about the SQL30081 message.

Related tasks:

- "Invoking contextual help from a DB2 tool" on page 108
- "Invoking the DB2 Information Center" on page 100
- "Invoking command help from the command line processor" on page 110

- "Invoking SQL state help from the command line processor" on page 110

Related reference:
- "db2 - Command Line Processor Invocation Command" in the *Command Reference*

Invoking command help from the command line processor

Command help explains the syntax of commands in the command line processor.

Procedure:

To invoke command help, open the command line processor and enter:

```
? command
```

where *command* represents a keyword or the entire command.

For example, `? catalog` displays help for all of the CATALOG commands, while `? catalog database` displays help only for the CATALOG DATABASE command.

Related tasks:
- "Invoking contextual help from a DB2 tool" on page 108
- "Invoking the DB2 Information Center" on page 100
- "Invoking message help from the command line processor" on page 109
- "Invoking SQL state help from the command line processor" on page 110

Related reference:
- "db2 - Command Line Processor Invocation Command" in the *Command Reference*

Invoking SQL state help from the command line processor

DB2 Univerrsal Database returns an SQLSTATE value for conditions that could be the result of an SQL statement. SQLSTATE help explains the meanings of SQL states and SQL state class codes.

Procedure:

To invoke SQL state help, open the command line processor and enter:

```
? sqlstate or ? class code
```

where *sqlstate* represents a valid five-digit SQL state and *class code* represents the first two digits of the SQL state.

For example, `? 08003` displays help for the 08003 SQL state, and `? 08` displays help for the 08 class code.

Related tasks:
- "Invoking the DB2 Information Center" on page 100
- "Invoking message help from the command line processor" on page 109
- "Invoking command help from the command line processor" on page 110

DB2 tutorials

The DB2® tutorials help you learn about various aspects of DB2 Universal Database. The tutorials provide lessons with step-by-step instructions in the areas of developing applications, tuning SQL query performance, working with data warehouses, managing metadata, and developing Web services using DB2.

Before you begin:

You can view the XHTML versions of the tutorials from the Information Center at http://publib.boulder.ibm.com/infocenter/db2help/.

Some tutorial lessons use sample data or code. See each tutorial for a description of any prerequisites for its specific tasks.

DB2 Universal Database tutorials:

Click on a tutorial title in the following list to view that tutorial.

Business Intelligence Tutorial: Introduction to the Data Warehouse Center
Perform introductory data warehousing tasks using the Data Warehouse Center.

Business Intelligence Tutorial: Extended Lessons in Data Warehousing
Perform advanced data warehousing tasks using the Data Warehouse Center.

Information Catalog Center Tutorial
Create and manage an information catalog to locate and use metadata using the Information Catalog Center.

Visual Explain Tutorial
Analyze, optimize, and tune SQL statements for better performance using Visual Explain.

DB2 troubleshooting information

A wide variety of troubleshooting and problem determination information is available to assist you in using DB2® products.

DB2 documentation
Troubleshooting information can be found throughout the DB2 Information Center, as well as throughout the PDF books that make up the DB2 library. You can refer to the ″Support and troubleshooting″ branch of the DB2 Information Center navigation tree (in the left pane of your browser window) to see a complete listing of the DB2 troubleshooting documentation.

DB2 Technical Support Web site
Refer to the DB2 Technical Support Web site if you are experiencing problems and want help finding possible causes and solutions. The Technical Support site has links to the latest DB2 publications, TechNotes, Authorized Program Analysis Reports (APARs), FixPaks and the latest listing of internal DB2 error codes, and other resources. You can search through this knowledge base to find possible solutions to your problems.

Access the DB2 Technical Support Web site at http://www.ibm.com/software/data/db2/udb/winos2unix/support

DB2 Problem Determination Tutorial Series

Refer to the DB2 Problem Determination Tutorial Series Web site to find information on how to quickly identify and resolve problems you might encounter while working with DB2 products. One tutorial introduces you to the DB2 problem determination facilities and tools available, and helps you decide when to use them. Other tutorials deal with related topics, such as ″Database Engine Problem Determination″, ″Performance Problem Determination″, and ″Application Problem Determination″.

See the full set of DB2 problem determination tutorials on the DB2 Technical Support site at http://www.ibm.com/software/data/support/pdm/db2tutorials.html

Related concepts:

- "DB2 Information Center" on page 92
- "Introduction to problem determination - DB2 Technical Support tutorial" in the *Troubleshooting Guide*

Accessibility

Accessibility features help users with physical disabilities, such as restricted mobility or limited vision, to use software products successfully. The following list specifies the major accessibility features in DB2® Version 8 products:

- All DB2 functionality is available using the keyboard for navigation instead of the mouse. For more information, see "Keyboard input and navigation."
- You can customize the size and color of the fonts on DB2 user interfaces. For more information, see "Accessible display" on page 113.
- DB2 products support accessibility applications that use the Java™ Accessibility API. For more information, see "Compatibility with assistive technologies" on page 113.
- DB2 documentation is provided in an accessible format. For more information, see "Accessible documentation" on page 113.

Keyboard input and navigation

Keyboard input

You can operate the DB2 tools using only the keyboard. You can use keys or key combinations to perform operations that can also be done using a mouse. Standard operating system keystrokes are used for standard operating system operations.

For more information about using keys or key combinations to perform operations, see Keyboard shortcuts and accelerators: Common GUI help.

Keyboard navigation

You can navigate the DB2 tools user interface using keys or key combinations.

For more information about using keys or key combinations to navigate the DB2 Tools, see Keyboard shortcuts and accelerators: Common GUI help.

Keyboard focus

In UNIX® operating systems, the area of the active window where your keystrokes will have an effect is highlighted.

Accessible display

The DB2 tools have features that improve accessibility for users with low vision or other visual impairments. These accessibility enhancements include support for customizable font properties.

Font settings

You can select the color, size, and font for the text in menus and dialog windows, using the Tools Settings notebook.

For more information about specifying font settings, see Changing the fonts for menus and text: Common GUI help.

Non-dependence on color

You do not need to distinguish between colors in order to use any of the functions in this product.

Compatibility with assistive technologies

The DB2 tools interfaces support the Java Accessibility API, which enables you to use screen readers and other assistive technologies with DB2 products.

Accessible documentation

Documentation for DB2 is provided in XHTML 1.0 format, which is viewable in most Web browsers. XHTML allows you to view documentation according to the display preferences set in your browser. It also allows you to use screen readers and other assistive technologies.

Syntax diagrams are provided in dotted decimal format. This format is available only if you are accessing the online documentation using a screen-reader.

Related concepts:

- "Dotted decimal syntax diagrams" on page 113

Dotted decimal syntax diagrams

Syntax diagrams are provided in dotted decimal format for users accessing the Information Center using a screen reader.

In dotted decimal format, each syntax element is written on a separate line. If two or more syntax elements are always present together (or always absent together), they can appear on the same line, because they can be considered as a single compound syntax element.

Each line starts with a dotted decimal number; for example, 3 or 3.1 or 3.1.1. To hear these numbers correctly, make sure that your screen reader is set to read out punctuation. All the syntax elements that have the same dotted decimal number (for example, all the syntax elements that have the number 3.1) are mutually exclusive alternatives. If you hear the lines 3.1 USERID and 3.1 SYSTEMID, you know that your syntax can include either USERID or SYSTEMID, but not both.

The dotted decimal numbering level denotes the level of nesting. For example, if a syntax element with dotted decimal number 3 is followed by a series of syntax elements with dotted decimal number 3.1, all the syntax elements numbered 3.1 are subordinate to the syntax element numbered 3.

Certain words and symbols are used next to the dotted decimal numbers to add information about the syntax elements. Occasionally, these words and symbols might occur at the beginning of the element itself. For ease of identification, if the word or symbol is a part of the syntax element, it is preceded by the backslash (\) character. The * symbol can be used next to a dotted decimal number to indicate that the syntax element repeats. For example, syntax element *FILE with dotted decimal number 3 is given the format 3 * FILE. Format 3* FILE indicates that syntax element FILE repeats. Format 3* * FILE indicates that syntax element * FILE repeats.

Characters such as commas, which are used to separate a string of syntax elements, are shown in the syntax just before the items they separate. These characters can appear on the same line as each item, or on a separate line with the same dotted decimal number as the relevant items. The line can also show another symbol giving information about the syntax elements. For example, the lines 5.1*, 5.1 LASTRUN, and 5.1 DELETE mean that if you use more than one of the LASTRUN and DELETE syntax elements, the elements must be separated by a comma. If no separator is given, assume that you use a blank to separate each syntax element.

If a syntax element is preceded by the % symbol, this indicates a reference that is defined elsewhere. The string following the % symbol is the name of a syntax fragment rather than a literal. For example, the line 2.1 %OP1 means that you should refer to separate syntax fragment OP1.

The following words and symbols are used next to the dotted decimal numbers:

- ? means an optional syntax element. A dotted decimal number followed by the ? symbol indicates that all the syntax elements with a corresponding dotted decimal number, and any subordinate syntax elements, are optional. If there is only one syntax element with a dotted decimal number, the ? symbol is displayed on the same line as the syntax element, (for example 5? NOTIFY). If there is more than one syntax element with a dotted decimal number, the ? symbol is displayed on a line by itself, followed by the syntax elements that are optional. For example, if you hear the lines 5 ?, 5 NOTIFY, and 5 UPDATE, you know that syntax elements NOTIFY and UPDATE are optional; that is, you can choose one or none of them. The ? symbol is equivalent to a bypass line in a railroad diagram.
- ! means a default syntax element. A dotted decimal number followed by the ! symbol and a syntax element indicates that the syntax element is the default option for all syntax elements that share the same dotted decimal number. Only one of the syntax elements that share the same dotted decimal number can specify a ! symbol. For example, if you hear the lines 2? FILE, 2.1! (KEEP), and 2.1 (DELETE), you know that (KEEP) is the default option for the FILE keyword. In this example, if you include the FILE keyword but do not specify an option, default option KEEP will be applied. A default option also applies to the next higher dotted decimal number. In this example, if the FILE keyword is omitted, default FILE(KEEP) is used. However, if you hear the lines 2? FILE, 2.1, 2.1.1! (KEEP), and 2.1.1 (DELETE), the default option KEEP only applies to the next higher dotted decimal number, 2.1 (which does not have an associated keyword), and does not apply to 2? FILE. Nothing is used if the keyword FILE is omitted.
- * means a syntax element that can be repeated 0 or more times. A dotted decimal number followed by the * symbol indicates that this syntax element can be used zero or more times; that is, it is optional and can be repeated. For example, if you hear the line 5.1* data area, you know that you can include one

data area, more than one data area, or no data area. If you hear the lines 3*, 3 HOST, and 3 STATE, you know that you can include HOST, STATE, both together, or nothing.

Notes:

1. If a dotted decimal number has an asterisk (*) next to it and there is only one item with that dotted decimal number, you can repeat that same item more than once.
2. If a dotted decimal number has an asterisk next to it and several items have that dotted decimal number, you can use more than one item from the list, but you cannot use the items more than once each. In the previous example, you could write HOST STATE, but you could not write HOST HOST.
3. The * symbol is equivalent to a loop-back line in a railroad syntax diagram.

- + means a syntax element that must be included one or more times. A dotted decimal number followed by the + symbol indicates that this syntax element must be included one or more times; that is, it must be included at least once and can be repeated. For example, if you hear the line 6.1+ data area, you must include at least one data area. If you hear the lines 2+, 2 HOST, and 2 STATE, you know that you must include HOST, STATE, or both. Similar to the * symbol, the + symbol can only repeat a particular item if it is the only item with that dotted decimal number. The + symbol, like the * symbol, is equivalent to a loop-back line in a railroad syntax diagram.

Related reference:

- "How to read the syntax diagrams" in the *SQL Reference, Volume 2*

Common Criteria certification of DB2 Universal Database products

DB2 Universal Database is being evaluated for certification under the Common Criteria at evaluation assurance level 4 (EAL4). For more information about Common Criteria, see the Common Criteria web site at: http://niap.nist.gov/cc-scheme/.

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