Informix Product Family
Informix
Version 12.10

IBM Informix Migration Guide

GC27-4529-05

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

Edition

This edition replaces GC27-4529-04.

Contents

Introduction

About this publication

This publication describes how to migrate to a new version of IBM Informix®, how to revert to the database server that you migrated from, and how to move data manually between databases, servers, and computers.

This publication includes information about how to use:

- The **dbexport**, **dbimport**, **dbload**, **dbschema**, **onload**, and **onunload** data-migration utilities
- The LOAD and UNLOAD SQL statements.
- The **onrestorept** utility, which you can use to restore data if an upgrade fails

This publication does not contain information about using the DSN (data source name) Migration Utility (**dsnmigrate.exe**) to migrate from one version of CSDK to another. For information about migrating DSN, see the "DSN Migration Utility" section in the *IBM Informix ODBC Driver Programmer's Manual*.

For information about migrating to previous versions of IBM® Informix database servers, see the *Migration Guide* in the documentation set for that version of the server.

Migration includes conversion (upgrading) to a later version of a database server, reversion to an earlier version of a database server, and movement of data between databases, database servers on the same operating system, database servers on different operating systems, and different kinds of database servers. Conversion or reversion often involves changing connectivity information in the **sqlhosts** file or registry key, host environment variables, configuration parameters, and other database server features.

What's new in migration for Informix, Version 12.10

This publication includes information about new features and changes in existing functionality.

The following changes and enhancements are relevant to this publication. For a complete list of what's new in this release, go to http://www.ibm.com/support/knowledgecenter/SSGU8G_12.1.0/com.ibm.po.doc/new_features_ce.htm.

Table 1. What's new for migration in Version 12.10.xC6

Overview	Reference
Server changes that affect migration Due to new features and functionality, Informix version 12.10.xC6 contains the following new configuration parameters and environment variable: • BAR_MAX_RESTORE configuration parameter • IFXGUARD configuration parameter • SHARD_ID configuration parameter • SHARD_MEM configuration parameter • SMX_NUMPIPES configuration parameter • TENANT_LIMIT_CONNECTIONS configuration parameter • TENANT_LIMIT_MEMORY configuration parameter • IFX_SOC_KEEPALIVE environment variable	"Configuration parameter changes in Version 12.10" on page 17-4 Chapter 16, "Environment variable changes by version," on page 16-1 Chapter 18, "SQL keyword changes by version," on page 18-1

Table 2. What's new for migration in Version 12.10.xC5

Overview	Reference
Server changes Due to new features and functionality, Informix 12.10.xC5 contains the following changed and new configuration parameters and environment option: • Changed configuration parameter: AUTO_REPREPARE • Changed configuration parameter: TAPESIZE • Changed configuration parameter: LTAPESIZE • Changed session environment option: IFX_AUTO_REPREPARE • New configuration parameter: TENANT_LIMIT_SPACE • New configuration parameter: SESSION_LIMIT_MEMORY • New configuration parameter: SESSION_LIMIT_TEMPSPACE • New configuration parameter: SESSION_LIMIT_LOGSPACE • New configuration parameter: SESSION_LIMIT_TXN_TIME	"Configuration parameter changes in Version 12.10" on page 17-4 Chapter 16, "Environment variable changes by version," on page 16-1 Chapter 18, "SQL keyword changes by version," on page 18-1
Support for Java™ 7 IBM Informix 12.10.xC5 software supports Java Platform Standard Edition (Java SE), Version 7. Informix installation applications install IBM Runtime Environment, Java Technology Edition, Version 7 on most platforms by default. That version is used to run Java user-defined routines that are created in the server.	Java technology dependencies

Table 2. What's new for migration in Version 12.10.xC5 (continued)

Overview	Reference
Rolling upgrades for high-availability clusters You can upgrade a high-availability cluster to the next fix pack or interim update (PID) with minimal interruption to client applications. During the rolling upgrade process, the cluster remains online even though the servers in the cluster are running on different levels of the software. For example, to upgrade from 12.10.xC4 to 12.10.xC5: Stop a secondary server in the cluster, install the new fix pack on it, and then start the upgraded server. After you upgrade all of the secondary servers, stop the primary server and promote one of the secondary servers to the primary server. Then, you can upgrade the original primary server, start it as a secondary server, and then promote it back to primary server.	"Rolling upgrade of an online cluster to the next fix pack or PID (UNIX, Linux)" on page 5-4

Table 3. What's new for migration in Version 12.10.xC4

Overview	Reference
Server changes Due to new features and functionality, Informix 12.10.xC4 contains the following server changes: • New configuration parameters: CDR_MEM, SESSION_LIMIT_LOCKS • Changed configuration parameter: VP_MEMORY_CACHE_VP • New environment variable: IFX_PUA_DISPLAY_MAPPING • New session environment option: IFX_SESSION_LIMIT_LOCKS • New SQL reserved word: IFX_SESSION_LIMIT_LOCKS • New system database table: **tenant** • Changed **sysindices** system catalog table: Contains new columns, **indexattr** and **jparam** The details are described in the *IBM Informix Administrator's Reference* and the *IBM Informix Guide to SQL: Reference*.	"Configuration parameter changes in Version 12.10" on page 17-4 Chapter 16, "Environment variable changes by version," on page 16-1 Chapter 18, "SQL keyword changes by version," on page 18-1 Chapter 19, "System catalog and system database changes by version," on page 19-1
Enterprise Replication conversion and reversion requirements Due to new functionality, if you use Enterprise Replication you must run conversion (`concdr.extension`) and reversion (`revcdr.extension`) scripts to migrate between Informix 12.10 fix packs.	"Migrating with Enterprise Replication" on page 4-2 "Reverting with Enterprise Replication" on page 4-3

Table 3. What's new for migration in Version 12.10.xC4 (continued)

Overview	Reference
JSON compatibility conversion and reversion requirements Support for JSON in databases was introduced in the 12.10.xC2 release, and databases created in 12.10.xC1 or earlier releases are not JSON compatible. Before you migrate to 12.10.xC4: No special preparation is necessary. The only exception is if you are migrating from 12.10.xC2 and you have binary JSON (BSON) columns with DATE fields. In that case you must unload the data by using an external table so that you can load the data into a new database table after migration. After you migrate to 12.10.xC4: All databases are converted to support JSON. If you migrated from 12.10.xC2 or 12.10.xC3, you might have to complete some post-migration steps depending on what JSON features you had used. If you revert to 12.10.xC2 or 12.10.xC3: Any databases that did not support JSON before conversion do not support JSON after reversion. However, you can run a script to make such databases JSON compatible.	"Preparing for migration" on page 3-1 "Completing required post-migration tasks" on page 6-5 "Add JSON compatibility to databases that were created in 12.10.xC1" on page 7-15
Easier to import tables with large rows You can allocate space efficiently when you import tables that have large rows by setting a default extent size of 16 KB. Include the new **-D** option of the **dbimport** utility to specify a default extent size of 16 KB. Extent sizes that you specify in the CREATE TABLE statement override the **-D** option. The **-D** option is useful especially when you import huge tables that contain large LVARCHAR columns.	"Syntax of the dbimport command" on page 9-8
Easier removal of outstanding in-place alter operations Removing outstanding in-place alter operations improves performance and is a prerequisite for reverting to an earlier version of Informix. You can easily remove outstanding in-place alter operations for tables or fragments in IBM OpenAdmin Tool (OAT) for Informix or with the new **table update_ipa** or **fragment update_ipa** argument of the **admin()** or **task()** SQL administration command. Previously, you ran a dummy UPDATE statement to remove outstanding in-place alter operations.	"Resolve outstanding in-place alter operations" on page 7-10

Table 4. What's new for migration in Version 12.10.xC3

Overview	Reference
Server changes Informix 12.10.xC3 includes new or changed configuration parameters, environment variables, and system catalog tables.	"Configuration parameter changes in Version 12.10" on page 17-4 Chapter 16, "Environment variable changes by version," on page 16-1

Table 4. What's new for migration in Version 12.10.xC3 (continued)

Overview	Reference
JSON compatibility pre- and post-migration requirements Before you migrate from Informix 12.10.xC2, if you have binary JSON (BSON) columns with DATE fields you must unload the data from the database server in JSON format by using an external table. After you migrate to 12.10.xC3, you must load the data from the external table into a new database server table in BSON format. If your databases were created in earlier versions of Informix 12.10, you must complete some post-migration steps for JSON compatibility: • Run the `convTovNoSQL1210.sql` script on databases that were originally created in 12.10.xC1 to make them JSON compatible. • If you used the JSON wire listener in 12.10.xC2 with a database that has any uppercase letters in its name, update your applications to use only lowercase letters in the database name.	"Preparing for migration" on page 3-1 "Completing required post-migration tasks" on page 6-5
New reversion requirements After you migrate to 12.10.xC3, you can revert to the version of the database server from which you migrated if the reversion requirements are met.	"Reversion requirements and limitations" on page 7-2
Temporarily prevent constraint validation You can significantly increase the speed of loading or migrating large tables by temporarily preventing the database server from validating foreign-key referential constraints. You can disable the validation of constraints when you create constraints or change the mode of constraints to ENABLED or FILTERING. When you migrate data, include the **-nv** option in the **dbimport** command. Use this feature only on tables whose enabled foreign-key constraints are free of violations, or when the referential constraints can be validated after the tables are loaded or migrated to the target database.	"Syntax of the dbimport command" on page 9-8

Table 5. What's new for migration in Version 12.10.xC2

Overview	Reference
Server changes Informix 12.10.xC2 includes new and changed configuration parameters and environment variables. This fix pack also supports these new SQL keywords: BSON, JSON, LATERAL.	Part 5, "New and changed features in Informix servers"
Converting 12.10.xC1 databases for JSON compatibility Before you can use JSON features with databases that were created in 12.10.xC1, you must run the `convTovNoSQL1210X2.sql` script after you install 12.10.xC2. However, if the databases do not require JSON compatibility, you do not have to run this script.	"Completing required post-migration tasks" on page 6-5

Table 5. What's new for migration in Version 12.10.xC2 (continued)

Overview	Reference
Reversion requirements After you migrate to Informix 12.10.xC2, you can revert to the version of the database server from which you migrated as long as the reversion requirements are met.	"Reversion requirements and limitations" on page 7-2

Table 6. What's new for migration in Version 12.10.xC1

Overview	Reference
Upgrading to Version 12.10 If you are migrating from Informix Version 11.70, 11.50, 11.10, or 10.0, you can migrate directly to Informix Version 12.10.	"Paths for migration to the new version" on page 1-7
64-bit ODBC applications If you have a 64-bit ODBC application that was compiled and linked with a version of IBM Informix Client Software Development Kit (Client SDK) that is prior to version 4.10, you must recompile the application after migrating.	"Completing required post-migration tasks" on page 6-5

Java technology dependencies

IBM Informix software supports Java Platform Standard Edition (Java SE) to create and run Java applications, including user-defined routines (UDRs). Java SE 7 is supported as of Informix 12.10.xC5, while Java SE 6 is supported in earlier fix packs.

Important:

- Check the machine notes to learn about Java technology exceptions and other requirements for specific operating system platforms. The machine notes are available on the product media and in the online release information.
- In general, any application that ran correctly with earlier versions of Java technology will run correctly with this version. If you encounter problems, recompile the application with the next available fix pack or version. However, because there are frequent Java fixes and updates, not all of them are tested.
- To develop Java UDRs for the database server, use the supported Java software development kit or an earlier version according to Java compatibility guidelines. The supported version provides a known and reliable Java environment for UDRs in this database server release.

For details about Java requirements, check the following sections:

"Java runtime environment"

"Software development kit for Java" on page xv

"Java Database Connectivity (JDBC) specification" on page xv

Java runtime environment

On most supported operating system platforms, the Informix installation application bundles a Java runtime environment that it requires. However, check

the machine notes for your operating system platform to determine whether the installation application requires a particular Java runtime environment to be preinstalled.

Also, IBM Runtime Environment, Java Technology Edition is supported for general use of the database server. It is installed on most operating system platforms by default in the following directory: `$INFORMIXDIR/extend/krakatoa/jre/`.

MongoDB API and REST API access supports IBM Runtime Environment, Java Technology Edition, Version 7.

Software development kit for Java

The following products and components require a software development kit for Java, but one is not installed:

- Informix DataBlade® Developers Kit (DBDK)
- IBM Informix JDBC Driver
- J/Foundation component
- Spatial Java API
- TimeSeries Java API

The software development kit that you use must be compatible with the supported Java runtime environment. Informix does not support OpenJDK. You can download a development kit from the following web sites:

- **Recommended for AIX and Linux:** IBM SDK, Java Technology Edition (http://www.ibm.com/developerworks/java/jdk/)
- **Recommended for HP-UX:** HP-UX 11i Java Development Kit for the Java 2 Platform Standard Edition (https://h20392.www2.hp.com/portal/swdepot/displayProductInfo.do?productNumber=HPUXJAVAHOME)
- Oracle Java Platform, Standard Edition Development Kit (JDK) (http://www.oracle.com/technetwork/java/javase/downloads/index.html)

Java Database Connectivity (JDBC) specification

Informix products and components support the Java Database Connectivity (JDBC) 3.0 specification.

Assumptions about your locale

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

The IBM Informix OLE DB Provider follows the ISO string formats for date, time, and money, as defined by the Microsoft OLE DB standards. You can override that default by setting an Informix environment variable or registry entry, such as GL_DATE.

If you use Simple Network Management Protocol (SNMP) in your Informix environment, note that the protocols (SNMPv1 and SNMPv2) recognize only English code sets. For more information, see the topic about GLS and SNMP in the *IBM Informix SNMP Subagent Guide*.

The examples in this publication are written with the assumption that you are using one of these locales: en_us.8859-1 (ISO 8859-1) on UNIX platforms or en_us.1252 (Microsoft 1252) in Windows environments. These locales support U.S. English format conventions for displaying and entering date, time, number, and currency values. They also support the ISO 8859-1 code set (on UNIX and Linux) or the Microsoft 1252 code set (on Windows), which includes the ASCII code set plus many 8-bit characters such as é and ñ.

You can specify another locale if you plan to use characters from other locales in your data or your SQL identifiers, or if you want to conform to other collation rules for character data.

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

Example code conventions

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

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

```
CONNECT TO stores_demo
...

DELETE FROM customer
   WHERE customer_num = 121
...

COMMIT WORK
DISCONNECT CURRENT
```

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

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

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

Additional documentation

Documentation about this release of IBM Informix products is available in various formats.

You can access Informix technical information such as information centers, technotes, white papers, and IBM Redbooks® publications online at http://www.ibm.com/software/data/sw-library/.

Compliance with industry standards

IBM Informix products are compliant with various standards.

IBM Informix SQL-based products are fully compliant with SQL-92 Entry Level (published as ANSI X3.135-1992), which is identical to ISO 9075:1992. In addition, many features of IBM Informix database servers comply with the SQL-92 Intermediate and Full Level and X/Open SQL Common Applications Environment (CAE) standards.

How to read the syntax diagrams

Syntax diagrams use special components to describe the syntax for SQL statements and commands.

Read the syntax diagrams from left to right and top to bottom, following the path of the line.

The double right arrowhead and line symbol ▸▸— indicates the beginning of a syntax diagram.

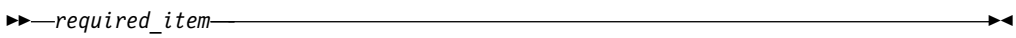
The line and single right arrowhead symbol —▸ indicates that the syntax is continued on the next line.

The right arrowhead and line symbol ▸— indicates that the syntax is continued from the previous line.

The line, right arrowhead, and left arrowhead symbol —▸◂ symbol indicates the end of a syntax diagram.

Syntax fragments start with the pipe and line symbol |— and end with the —| line and pipe symbol.

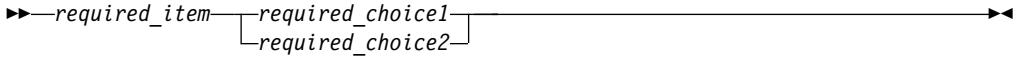
Required items appear on the horizontal line (the main path).



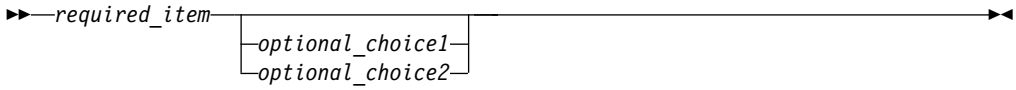
Optional items appear below the main path.

If you can choose from two or more items, they appear in a stack.

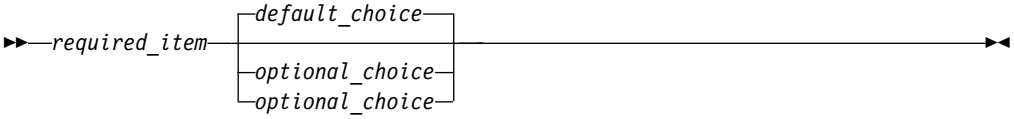
If you *must* choose one of the items, one item of the stack appears on the main path.



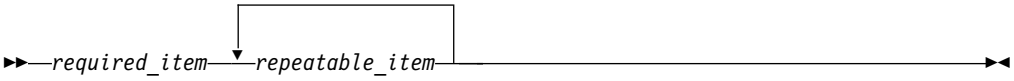
If choosing one of the items is optional, the entire stack appears below the main path.



If one of the items is the default, it will appear above the main path, and the remaining choices will be shown below.



An arrow returning to the left, above the main line, indicates an item that can be repeated. In this case, repeated items must be separated by one or more blanks.



If the repeat arrow contains a comma, you must separate repeated items with a comma.

A repeat arrow above a stack indicates that you can make more than one choice from the stacked items or repeat a single choice.

SQL keywords appear in uppercase (for example, `FROM`). They must be spelled exactly as shown. Variables appear in lowercase (for example, `column-name`). They represent user-supplied names or values in the syntax.

If punctuation marks, parentheses, arithmetic operators, or other such symbols are shown, you must enter them as part of the syntax.

Sometimes a single variable represents a syntax segment. For example, in the following diagram, the variable `parameter-block` represents the syntax segment that is labeled **parameter-block**:

parameter-block:

How to provide documentation feedback

You are encouraged to send your comments about IBM Informix product documentation.

Add comments about documentation to topics directly in IBM Knowledge Center and read comments that were added by other users. Share information about the product documentation, participate in discussions with other users, rate topics, and more!

Feedback is monitored by the team that maintains the user documentation. The comments are reserved for reporting errors and omissions in the documentation. For immediate help with a technical problem, contact IBM Software Support at http://www.ibm.com/planetwide/.

We appreciate your suggestions.

Part 1. Overview of migration

Chapter 1. Overview of Informix migration

Before you upgrade to the new version of Informix, ensure that you understand the migration process, prerequisites, and reversion options.

The migration process

This overview of the migration process describes what you need to know to plan your migration and the resources that you can use to assist you.

Careful planning will ensure minimal impact on your business.

Migration effort

Depending on your environment, the migration process can take a few hours or several weeks.

The migration effort is determined by many factors:

- Your current version of Informix. The older the version, the greater the effort.
- The site architecture and configuration, before and after migration.
- The level of site customization, before and after migration.
- Integration of additional software products.
- To some extent, the size of the database.

Migration skills

Your Informix migration team needs database administration skills, system administration skills, and application programming skills.

The migration team needs:

- Database administration skills, to help migrate custom database extensions.
- System administration skills, to perform various system tasks. These tasks include operating system installation, configuration and maintenance and the installation and configuration of Informix and any additional software products.
- Application programming skills, to create and maintain scripts to evaluate and modify application programs.

If you prefer, highly-skilled IBM Services personnel and business partners are available to assist you in migrating your environment. Contact your IBM representative for further information.

Migration plans

Before you begin to migrate to a new version of the database server, you should plan for migration.

To plan your migration requirements, complete these tasks:

1. Inventory the existing Informix environment assets, such as machines, instances, databases, database customization, custom code, IBM software, and third-party software.
2. Itemize the requirements for the post-migrated environment. New requirements can include upgrading or adding hardware, using new features, or replacing custom-code with new built-in function.
3. Plan the migration activities. Typical activities include:
   - Performing a level-0 backup of the database.
   - Quiescing the database server and preventing connections to the database until migration completes.

     Important: Any connection attempts (for example, from cron jobs or monitoring scripts) to the database after you quiesce the database server and during migration will cause migration to fail.
   - Installing the new version of Informix.
   - Migrating database data.
   - Reverting to the previous version.
   - Migrating applications before using them with the new database server.

Depending on your environment, you might need to perform some of these activities more than once. You might not need to restore the level-0 backup; however, if you encounter problems you can always restore the backup of your current server.

Types of migration

There are three ways to migrate to Informix Version 12.10.

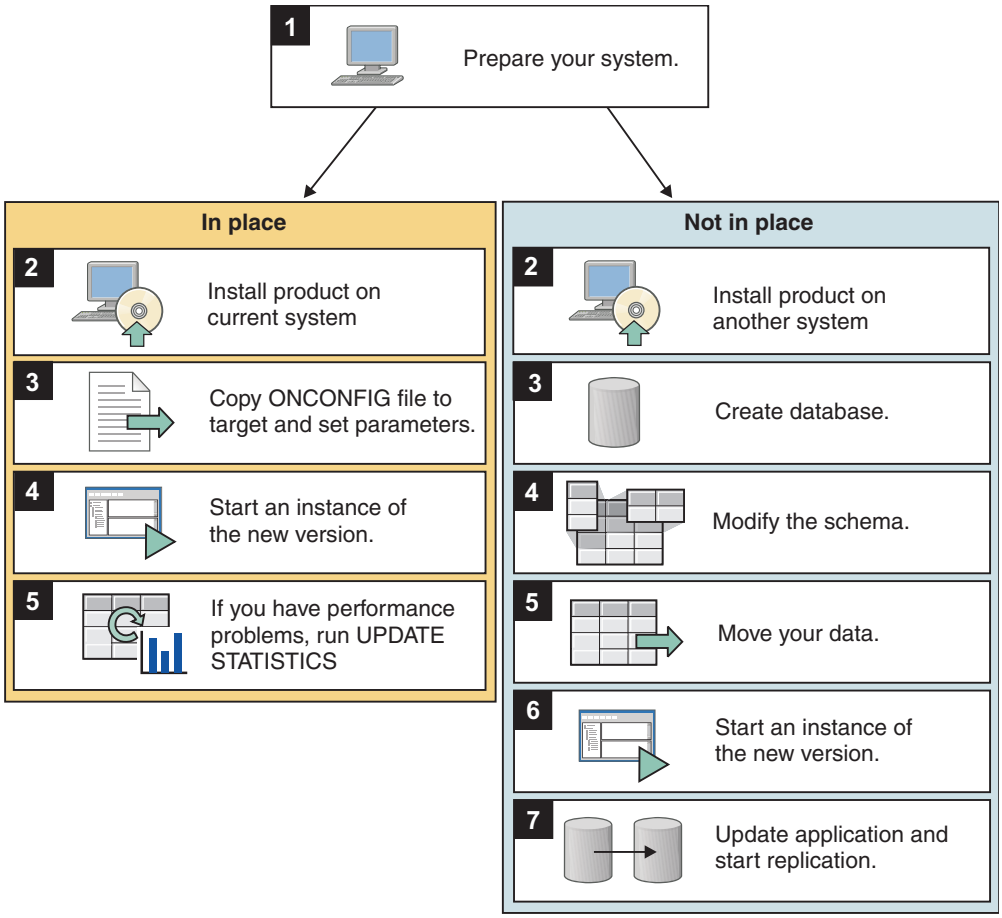
Upgrading (In-place migration)
: Upgrading is a special case of migration that uses your existing hardware and operating system. You install a new or improved version of the product in a different location from your current version on the same machine. You can copy your configuration file and add new parameters. When you start the new Informix instance, the database data is automatically converted. For example, you can upgrade from Version 11.70 to Version 12.10.

Migrating (Non-in-place migration)
: The process of "switching over" your environment from one computer to another. This type of migration requires more planning and setup time compared to upgrading on your existing computer. Non-in-place migration requires that you modify and copy the database schema, user data, and user objects from one server to another server. Use this type of migration if you are moving to Informix Version 12.10 from an early version of Informix that has a different architecture, page size, optimization of dbspaces, and extent allocations.

Migrating from a non-IBM database
: The process of moving your data from another database management system (DBMS) such as Oracle or Sybase SQL Anywhere to Informix Version 12.10. This type of migration is especially useful if you are currently using various products. You can consolidate to take advantage of the Informix features and total cost of ownership.

If you have a high-availability cluster with one or more secondary database servers or if you use Enterprise Replication, you follow additional procedures to upgrade your servers.

The following illustration shows the differences between in-place and non-in-place migration.



Related concepts:

Chapter 4, “Enterprise Replication and migration,” on page 4-1

Chapter 5, “High-availability cluster migration,” on page 5-1

Chapter 3, “Preparing for migration to Version 12.10,” on page 3-1

Migration tools

You can choose from various migration tools, depending on the task that you must perform.

- For in-place upgrades: You do not use any migration tools. Simply start the server by using the **oninit** utility. The data from the source database server is converted to the target database server automatically.
- For non-in-place migration: You can use distributed queries to move your data, or you can pick from a number of data transfer tools and utilities, such as:
  - **dbexport** and **dbimport**
  - **onload** and **onunload**
  - **dbload**

– High Performance Loader (HPL)
– External tables

Each of these tools and utilities has specific advantages and limitations. Consider all of the variables and pick a tool or utility that is appropriate for your situation.

You can use several different methods to move your data from non-IBM products to Informix.

Related reference:

"Data-migration tools" on page 2-1

Upgrading Informix (in-place migration)

In-place migration upgrades Informix directly to the current version by installing the product in a new directory on the same computer, copying a few configuration files, and starting the new server to automatically convert your database data.

In-place migration uses your existing test and production hardware. The operating system on those computers must be supported by the new version of the server. Also, you must have enough space for the system database data conversion.

Upgrading consists of these steps:

1. Prepare your system. That includes closing all transactions, verifying the integrity of the data with the **oncheck** utility, and performing a level-0 backup. (If you are using Enterprise Replication or high-availability clusters, you must stop replication and perform required extra tasks.)

   If you remove in-place alter operations before you upgrade, you might speed up the upgrade process. Use a process similar to removing in-place alter operations during reversion.
2. **UNIX:** Log in to the database server as the **root** user or, for a non-root installation, log in as the user who owns the database server.
3. **Windows:** Log in to the database server as a member of the Administrator's group or, for a non-root installation, log in as the user who owns the database server.
4. Install the new product on the computer.

   Important: The safest way to upgrade to a new version is to install the new version in another directory. To save space, you can select the product components that you want to install. After you test the database server instance with the similar configuration settings and the client connection information that you use for your current database server, you can remove the old version.

   If you do not have space on your computer for two versions, install the new version over the existing version. In this case, you cannot selectively install components; you must install the whole product to block objects from the previous version. Before you choose this approach, make sure that you have the original installation media for the old version because you cannot automatically revert to it.
5. Copy the appropriate configuration files, such as the `onconfig` file and the `sqlhosts` file, to the new `INFORMIXDIR/etc` directory. Set parameters that are new for the current release.
6. Set the **INFORMIXDIR** environment variable to the directory of the new installation.
7. Start an instance of the new version of Informix. The database data is automatically converted.

8. If you notice performance problems, run UPDATE STATISTICS and UPDATE STATISTICS FOR PROCEDURE operations.

This type of migration minimizes the risk of introducing errors. You can always revert from the new server to the old one. If you have a problem during reversion, you can restore the level-0 backup.

Related concepts:

"Migrating Informix (non-in-place migration)"

"Hardware and operating system requirements" on page 1-6

Chapter 3, "Preparing for migration to Version 12.10," on page 3-1

Chapter 4, "Enterprise Replication and migration," on page 4-1

Chapter 5, "High-availability cluster migration," on page 5-1

"Resolve outstanding in-place alter operations" on page 7-10

"Installing the new version of Informix" on page 6-2

Related information:

Installation owner

Migrating Informix (non-in-place migration)

Depending on your existing database server setup, you might need to move to a new architecture or a different server. This type of migration is more complicated than in-place migration. It requires more planning and it is more time consuming.

The non-in-place type of migration consists of these steps:

1. Prepare your system. That includes closing all transactions, verifying the integrity of the data with **oncheck**, and performing a level-0 backup. If you are using Enterprise Replication or High-Availability Data Replication, stop replication.
2. Install the new product on a new machine.
3. Create a database with the current schema (**dbschema -d dbname -ss**).
4. Modify the schema for new extent allocations and lock mode changes. If applicable, modify schema for new dbspaces.
5. Move data by using the appropriate utility or tool, or by using distributed queries.
6. Start the Informix Version 12.10 instance.
7. After Informix migration, upgrade applications before running them. Also, if you use Enterprise Replication or high-availability clusters, you must perform additional tasks.

Related concepts:

"Upgrading Informix (in-place migration)" on page 1-4

"Hardware and operating system requirements" on page 1-6

Chapter 3, "Preparing for migration to Version 12.10," on page 3-1

Chapter 4, "Enterprise Replication and migration," on page 4-1

Chapter 5, "High-availability cluster migration," on page 5-1

"Installing the new version of Informix" on page 6-2

Related reference:

"Data-migration tools" on page 2-1

Hardware and operating system requirements

Ensure that you meet the operating system and hardware requirements for Informix Version 12.10.

Before you upgrade or migrate to the current version of Informix, ensure that the system you choose meets the necessary operating system, hardware, disk, and memory requirements.

For a complete list of supported operating systems and hardware prerequisites for Informix, go to http://www.ibm.com/support/docview.wss?uid=swg27013343.

If you are running an earlier version of Informix on an operating system that is no longer supported, you must migrate to a supported operating system.

Your hardware must support the operating systems that Informix Version 12.10 supports, and it must provide enough disk space for the database server and all your other software applications.

Check the machine notes for information about the operating-system patches that you need for successful installation and operation of the database server. Follow any platform-specific instructions in the machine notes.

UNIX, Linux: You might have to change some of the kernel parameters for your UNIX or Linux operating system before you install Informix Version 12.10. Refer to the kernel-configuration instructions for your operating system.

Related concepts:

"Upgrading Informix (in-place migration)" on page 1-4

"Migrating Informix (non-in-place migration)" on page 1-5

Related tasks:

"Preparing for migration" on page 3-1

Fix pack naming conventions

Informix releases and fix packs contain version names that appear in the format `aa.bb.xCn`.

In this format:

- `aa` = major release number
- `bb` = minor release number
- `x` = all supported operating system platforms, unless one of the following characters appears in the position of `x`:
  - `F` = 64-bit on supported UNIX, Linux, or Windows platforms
  - `J` = Java
  - `T` = 32-bit on supported Windows platforms
  - `U` = 32-bit on supported UNIX or Linux platforms
- C = GA release
- n = fix pack level

For example, in Version 12.10.xC2, `12` is the major release number, `10` is the minor release number, `x` means any platform, `C` means GA release, and `2` means fix pack 2.

For information about interim updates such as a PID (post interim drop) or patch release fix pack, go to Informix Noncommercial Fix Packs.

Paths for migration to the new version

Direct migration to Informix 12.10 is supported for specific earlier versions of the database server.

Important: As new versions of products are released, some earlier versions of the products are no longer supported. For information about the kind of support available for your product version, go to the *Information Management Product Lifecycle* page at http://www.ibm.com/software/data/support/lifecycle/.

Migration paths

If you are on Version 11.70, 11.50, 11.10, or 10.00, you can migrate directly to Version 12.10 on the same operating system.

If you are on earlier versions of the database server, consider these options:

- Migrate from Version 9.40 and Version 7.31 to either Version 11.70 or Version 11.50 of the database server before you migrate to Version 12.10. Refer to the migration information that is included in the documentation set for the interim version of the database server.
- Install Version 12.10 in a new location, and then use the **dbexport** and **dbimport** utilities or distributed SQL to move your data into the new database server.

If necessary, you can revert to the version of the database server from which you upgraded. You cannot revert to any other version of the database server.

Related concepts:

Chapter 9, “The dbexport and dbimport utilities,” on page 9-1

“Moving data by using distributed SQL” on page 2-6

Chapter 8, “Migrating database servers to a new operating system,” on page 8-1

Chapter 2. Overview of moving data

If you are installing the new version of the database server on another computer or operating system (non-in-place migration), you can use one of several tools and utilities to move data from your current database server.

For example, suppose you migrated to the current version of Informix and created a few new databases, but decide to revert to the previous version. Before you revert, you can use one of the data-migration tools to save the data you added. After reverting, you can reload the data.

Before you move data, consider these issues:

- Changes in the configuration parameters and environment variables
- Amount of memory and dbspace space that is required
- Organization of the data
- Whether you want to change the database schema to accommodate more information, to provide for growth, or to enhance performance

For information about how to move data between database servers on different operating systems, also see Chapter 8, "Migrating database servers to a new operating system," on page 8-1.

For information about how to move to a different GLS locale, see the *IBM Informix GLS User's Guide*.

Prerequisites before moving data

Before you use any data migration utility, you must set your PATH, INFORMIXDIR, and INFORMIXSERVER environment variables.

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

Data-migration tools

Informix provides tools, utilities, and SQL statements that you can use to move data from one IBM Informix database to another or from one operating system to another.

You might want to use a data-migration tool when you have different page sizes or code pages. For example, UNIX or Linux and Windows store data in different page sizes.

When your migration involves migrating between different operating systems, you must export data and its schema information from one database server and import the exported data into the other database server.

Normally, if you are migrating on the same operating system, you do not need to load and unload data.

You can use the following tools to move data:

- The **dbexport** and **dbimport** utilities
- The **dbload** utility
- The **onunload** and **onload** utilities
- UNLOAD and LOAD statements
- The High-Performance Loader (HPL)
- Nonlogging raw tables

When you import data from non-Informix sources, you can use the following tools:

- The **dbimport** and **dbload** utilities
- The High-Performance Loader (HPL)
- IBM Informix Enterprise Gateway products
- External tables that you create with the CREATE EXTERNAL TABLE statement

The best method for moving data depends on your operating system and whether you want to move an entire database, selected tables, or selected columns from a table. The following table summarizes the characteristics of the methods for loading data and the advantages and disadvantages of each method. The table also shows the database servers on which you can use the tools.

Table 2-1. Comparison of tools for moving data

Tool	Description	Advantages	Disadvantages
dbexport and **dbimport** utility	Imports or exports a database to a text file that is stored on disk or tape	Can modify the database schema and change the data format Can move data between operating systems Optional logging Can import data from non-Informix sources	Faster performance than the **dbload** utility, but slower performance than the **onload** utility Moves the entire database
dbload utility	Transfers data from one or more text files into one or more existing tables	Can modify database schema Can move data between operating systems Optional logging Moderately easy to use Can import data from non-Informix sources	Slower performance than the **dbexport**, **dbimport**, and **onload** utilities
onunload and **onload** utilities	Unloads data from a database into a file on tape or disk; loads data, which was created with the **onunload** command, into the database server	Fast performance Optional logging	Only moves data between database servers of the same version on the same operating system Cannot modify the database schema Logging must be turned off Difficult to use

Table 2-1. Comparison of tools for moving data (continued)

Tool	Description	Advantages	Disadvantages
UNLOAD and LOAD statements	Unloads and loads specified rows	Can modify database schema Can move data between operating systems Easy to use Optional logging	Only accepts specified data formats
HPL	Loads data from any ASCII or COBOL file that meets certain format requirements	For extremely large databases, has a performance advantage over other IBM Informix data-migration utilities, because it performs I/O and code-set conversions in parallel Can modify database schema Can move data between operating systems Can import data from non-Informix sources	Requires significant preparation time
Nonlogging raw tables	Loads certain kinds of large tables	Can load very large data warehousing tables quickly	Does not support primary constraints, unique constraints, and rollback Requires SQL Not recommended for use within a transaction
External tables	Enables you to read and write from a source that is external to the database server, providing an SQL interface to data in text files managed by the operating system or to data from a FIFO device.	Performs express (high-speed) and deluxe (data-checking) transfers	Requires SQL

If you are choosing a tool for loading data, the questions shown in Figure 2-1 on page 2-4 will help you make a decision.

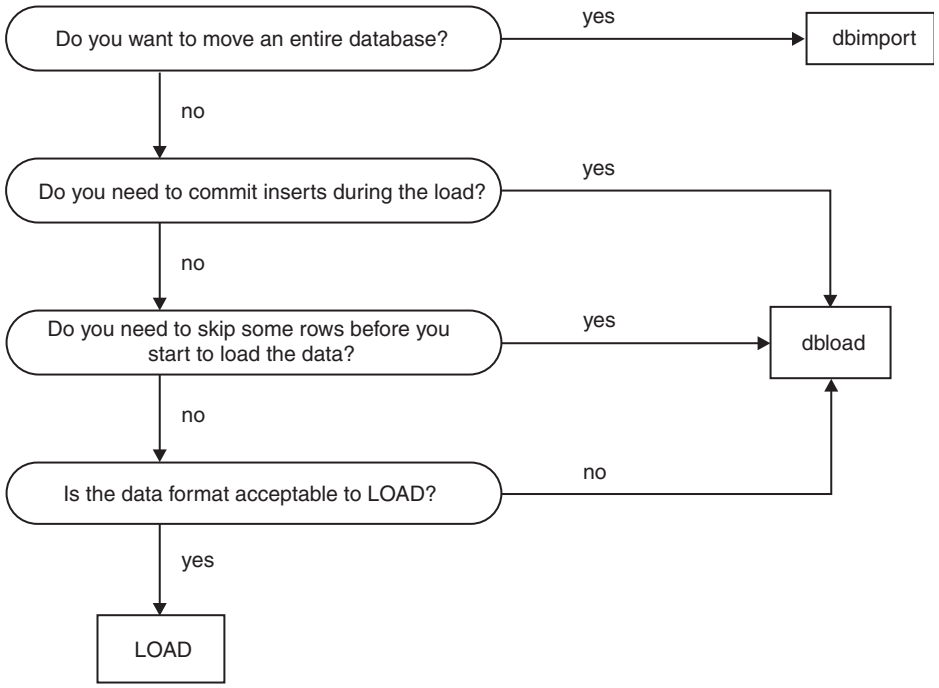


Figure 2-1. Choosing among dbimport, dbload, and LOAD

In addition to the tools that move data, you can use the **dbschema** utility, which gets the schema of a database and redirects the output to a file, so you can provide the file to DB–Access to re-create the database.

Related concepts:

"Migrating Informix (non-in-place migration)" on page 1-5
"Migration tools" on page 1-3
Chapter 9, "The dbexport and dbimport utilities," on page 9-1
Chapter 13, "The onunload and onload utilities," on page 13-1
Chapter 10, "The dbload utility," on page 10-1
Chapter 11, "The dbschema utility," on page 11-1
Chapter 12, "The LOAD and UNLOAD statements," on page 12-1
"High-Performance Loader performance advantages for large databases"

Related information:

Moving data with external tables
CREATE EXTERNAL TABLE Statement

High-Performance Loader performance advantages for large databases

The High-Performance Loader (HPL) utility, which can load data from any ASCII or COBOL file that meets certain format prerequisites, uses parallel processing to perform fast data loading and unloading. However, the HPL requires significant preparation time.

For extremely large databases, the HPL has a performance advantage over other IBM Informix data-migration utilities because it performs I/O and code-set conversions in parallel. Use the HPL only for large databases, for which the time savings in the actual loading or unloading of data makes the preparation time worthwhile.

The following HPL features provide powerful tools for handling data from non-Informix sources:

- Drivers to handle different database types
- Filters and functions to manipulate data
- Code-set conversion
- The **ipload** GUI for UNIX
- The **onpladm** command-line utility for UNIX and Windows

For more information about the HPL, refer to the *IBM Informix High-Performance Loader User's Guide*.

Related concepts:

"Choosing a tool for moving data before migrating between operating systems" on page 8-1

Related reference:

"Data-migration tools" on page 2-1

Related information:

Moving data with external tables

CREATE EXTERNAL TABLE Statement

When TEXT and BYTE data is scanned, not compressed

The Informix database server scans TEXT and BYTE data into an existing table when you load data by using the SQL LOAD statement, the **dbload** utility, the Informix ESQL/C program, the HPL, or external tables.

Informix database servers do not have any mechanisms for compressing TEXT and BYTE data after the data has been scanned into a database.

Moving data between computers and dbspaces

You can move data between different computers, and you can import data from environments other than the Informix database server. Except when you use the High-Performance Loader (HPL) utility or external tables, you must unload your data to ASCII files before you move the data to another computer.

If you are moving data into the Informix database server on another computer, you can use the **dbimport** and **dbload** utilities to load the data that you exported.

If you are moving data to an application that is not based on Informix, you might need to use the UNLOAD statement because you can specify the delimiter that is used in the data files.

Importing data from a non-Informix source

The **dbimport** and **dbload** utilities can import data from any ASCII file that is properly formatted.

Most applications that produce data can export the data into files that have a suitable format for **dbimport**. If the format of the data is not suitable, use UNIX, Linux, or Windows utilities to reformat the data before you import it.

In addition to **dbimport** and **dbload**, the IBM Informix Enterprise Gateway products and the HPL provide ways to access information from non-Informix sources.

Importing data with Enterprise Gateway products

You can use IBM Informix Enterprise Gateway with DRDA® to query a DRDA database and then insert the results into yourInformix database.

For example, to import data, run a SELECT statement to select data from the other database and then run an INSERT statement to insert data into the Informix database. For more information, refer to the *IBM Informix Enterprise Gateway with DRDA User Manual*.

IBM Informix Enterprise Gateway provides a single, standards-based gateway to multiple data sources. Gateway Manager connects the Informix environment with that of any shared-library ODBC Level 2-compliant driver manager and driver on UNIX or Linux. For instance, you can use Gateway Manager with the IBM Informix Enterprise Gateway driver products to access UNIX or Linux database server products. For more information, refer to the *IBM Informix Enterprise Gateway with DRDA User Manual*.

Moving data by using distributed SQL

If you want to move data with different binary pages and page sizes across platforms and you have expertise in using distributed SQL, you can use INSERT and SELECT SQL statements to transfer the data.

Important: Do not use INSERT and SELECT statements to move data if the database contains BLOB data types.

Prerequisites: A network connection must exist between database server instances.

To move data using INSERT and SELECT statements with fully qualified table names:

1. Capture the complete database schema from the source database server.
2. Alter the extent sizing and, if necessary, the lock modes on tables from page to row.
3. Create and verify the schema on the target database server.
4. Disable logging on both source and target servers where necessary.
5. Create and run the following scripts:
   a. Create and run separate scripts for:
      - Disabling select triggers on the source server
      - Disabling indexes, triggers and constraints for each table on the target database server.
   b. Create and run one script per table for the fully-qualified INSERT and SELECT statements.

      For example:

      ```
      INSERT INTO dbname@target:owner.table SELECT *
      FROM dbname@source:owner.table
      ```

      You can run the scripts in parallel. In addition, for larger tables, you can create multiple scripts that can partition the table to run in parallel.
   c. Create and run separate scripts for enabling indexes, triggers and constraints for each table
6. Run UPDATE STATISTICS on system catalog tables and stored procedures and functions on the target database server.

7. Adjust starting values for all tables that have serial columns on the target database server.
8. Turn on transaction logging on the source and target database servers.
9. Return the source and target database servers to multi-user mode.
10. Validate the data that was transferred to the target database server.

For information about INSERT and SELECT statements, refer to the *IBM Informix Guide to SQL: Syntax*. For information on distributed transactions, refer to the *IBM Informix Administrator's Guide* and the *IBM Informix Administrator's Reference*.

Related concepts:

"Paths for migration to the new version" on page 1-7

Part 2. Migration to and reversion from Version 12.10

Chapter 3. Preparing for migration to Version 12.10

Before you install the new version of Informix, you must prepare the database server environment for migration by performing specified pre-migration tasks. If you are also migrating from 32-bit to 64-Bit database servers, you must perform additional tasks.

Related concepts:

"Upgrading Informix (in-place migration)" on page 1-4

"Types of migration" on page 1-2

"Migrating Informix (non-in-place migration)" on page 1-5

Preparing for migration

Preparing for migration includes gathering information about and backing up your data, so that you can reinstall the previous version of the server and restore your data if you have a migration problem. Preparing for migration is crucial for successful migration.

- Check the IBM Support Portal for the latest patches that you must install before you migrate or upgrade Informix software.
- If you use Enterprise Replication, you must first prepare your replication environment for migration. For more information, see Chapter 4, "Enterprise Replication and migration," on page 4-1.

Review and complete all tasks that apply:

1. "Reviewing changes in Informix product functionality" on page 3-2.
2. "Checking and configuring available space" on page 3-2.
3. "Configuring for recovery of restore point data in case an upgrade fails" on page 3-4.
4. Renaming user-defined routines (UDRs) that have the following names: CHARINDEX() , LEFT(), RIGHT(), INSTR(), DEGREES(), RADIANS(), REVERSE(), SUBSTRING_INDEX(), LEN(), and SPACE(). These names are reserved for built-in SQL string manipulation functions.
5. Adjusting settings:
   a. If you use UNICODE, ensure that the GL_USEGLU environment variable on the source server is set to the same value as the GL_USEGLU environment variable on the target server.
   b. If the source version of the database server contains the IFX_EXTEND_ROLE configuration parameter, which controls authorization to register DataBlade modules or external UDRs, disable the parameter by setting it to `0` (off).
6. "Saving copies of the current configuration files" on page 3-5.
7. "Preparing 12.10.xC2 BSON columns with DATE fields for upgrade" on page 3-6.
8. "Closing all transactions and shutting down the source database server" on page 3-6.
9. "Initiating fast recovery to verify that no open transactions exist" on page 3-7.
10. "Verifying the integrity of the data" on page 3-7.
11. "Verifying that the database server is in quiescent mode" on page 3-8.

12. "Making a final backup of the source database server" on page 3-8.

    Important: Complete the previous step in case you have to revert to the source database server.
13. "Verifying that the source database server is offline" on page 3-8.

If you use high-availability clusters, you must complete additional preparations. See Chapter 5, "High-availability cluster migration," on page 5-1.

Related concepts:

"Hardware and operating system requirements" on page 1-6

Related reference:

"Pre-migration checklist of diagnostic information" on page 3-9

Reviewing changes in Informix product functionality

Changes to Informix product functionality might affect your plans for migrating to the latest version of the product.

Changes in functionality in Informix 12.10 can potentially impact your applications, scripts, maintenance processes, and other aspects that are related to your database server environment.

Changes to functionality that was introduced before Informix 12.10 can also affect your plans.

Review the changes that are described in Part 5, "New and changed features in Informix servers," evaluate the impact to your environment, and plan how to address the changes before migration.

Checking and configuring available space

Before you migrate to the new version of Informix, you must make sure that you have enough available space for the new server, your data, and any other network and data tools that you use.

During migration, Informix drops and then recreates the **sysmaster** database. Depending on which version of Informix you migrate from, the **sysmaster** database in the current version can be significantly larger.

When you migrate to Version 12.10, you need the following space for building **sysmaster**, **sysutils**, and **sysadmin** databases:

- 21892 KB of logical-log spaces (or 10946 pages) for 2 K page platforms
- 26468 KB of logical-log spaces (or 6617 pages) for 4 K page platforms

During migration, a second database, the **sysadmin** database, is created in the **root** dbspace. As you work after migrating, the **sysadmin** database, could grow dramatically. You can move the **sysadmin** database to a different dbspace.

You might need to increase the physical log size to accommodate new features, and you might consider adding a new chunk.

If your migration fails because there is insufficient space in the partition header page, you must unload your data before you try to migrate again. Then you must manually load the data into the new version.

The root chunk should contain at least ten percent free space when converting to the new version of the server.

In some cases, even if the database server migration is successful, internal conversion of some databases might fail because of insufficient space for system catalog tables. For more information, see the release notes for this version of Informix.

Add any additional free space to the system prior to the migration. If the dbspaces are nearly full, add space before you start the migration procedure. When you start the new version of Informix on the same root dbspace of the earlier database server, Informix automatically converts the **sysmaster** database and then each database individually.

For a successful conversion of each database, ensure that 2000 KB of free space per database is available in each dbspace where a database resides.

To ensure enough free space is available:

1. Calculate the amount of free space that each dbspace requires.

   In the following equation, *n* is the number of databases in the dbspace and *X* is the amount of free space they require:

   X kilobytes free space = 2000 kilobytes * *n*

   The minimum number of databases is 2 (for the **sysmaster** and **sysadmin** databases).
2. Check the amount of free space in each dbspace to determine whether you need to add more space.

You can run SQL statements to determine the free space that each dbspace requires and the free space available. These statements return the free-space calculation in page-size units. The **free_space_req** column value is the free-space requirement, and the **free_space_avail** column value is the free space available.

The following SQL statement shows how to determine the free space that each dbspace requires:

```
DATABASE sysmaster;
SELECT partdbsnum(partnum) dbspace_num,
       trunc(count(*) * 2000) free_space_req
   FROM sysdatabases
GROUP BY 1
ORDER BY 1;
```

The following SQL statement queries the **syschunks** table and displays the free space available for each dbspace:

```
SELECT dbsnum dbspace_num, sum(nfree) free_space_avail
   FROM syschunks
GROUP BY 1
ORDER BY 1;
```

Important: If less free space is available than the dbspace requires, either move a table from the dbspace to another dbspace or add a chunk to the dbspace.

The dbspace estimates could be higher if you have an unusually large number of SPL routines or indexes in the database.

Related concepts:

"Check and configure available space for reversion" on page 7-8

Configuring for recovery of restore point data in case an upgrade fails

By default, the CONVERSION_GUARD configuration parameter is enabled and a temporary directory is specified in the RESTORE_POINT_DIR configuration parameter. These configuration parameters specify information that Informix can use if an upgrade fails. You can change the default values of these configuration parameters before beginning an upgrade.

Prerequisites: The directory specified in the RESTORE_POINT_DIR configuration parameter must be empty before the upgrade begins, but not when recovering from a failed update.

Important:

After a failed upgrade, do not empty the RESTORE_POINT_DIR directory before you attempt to run the **onrestorept** utility. The server must be offline after a failed upgrade.

You can change the value of the CONVERSION_GUARD configuration parameter or the directory for restore point files before beginning an upgrade. The default value for the CONVERSION_GUARD configuration parameter in the ONCONFIG file is (2), and the default directory where the server will store the restore point data is `$INFORMIXDIR/tmp`. You must change this information before beginning an upgrade. You cannot change it during an upgrade.

To change information:

1. If necessary for your environment, change the value of the CONVERSION_GUARD configuration parameter.

   When the CONVERSION_GUARD configuration parameter is set to 2 (the default value), the server will continue the upgrade even if an error related to capturing restore point data occurs, for example, because the server has insufficient space to store the restore point data.

   However, if the CONVERSION_GUARD configuration parameter is set to 2 and the upgrade to the new version of the server fails, you can use the **onrestorept** utility to restore your data.

   However, if you set the CONVERSION_GUARD configuration parameter to 2, conversion guard operations fail (for example, because the server has insufficient space to store restore point data), and the upgrade to the new version fails, you cannot use the **onrestorept** utility to restore your data.
2. In the RESTORE_POINT_DIR configuration parameter, specify the complete path name for a directory that will store restore point files.

   The server will store restore point files in a subdirectory of the specified directory, with the server number as the subdirectory name.

If the CONVERSION_GUARD configuration parameter is set to 1 and an upgrade fails, you can run the **onrestorept** utility to restore the Informix instance back to its original state just before the start of the upgrade.

If the CONVERSION_GUARD configuration parameter is set to 1 and conversion guard operations fail (for example, because the server has insufficient space to store restore point data), the upgrade to the new version will also fail.

If any restore point files from a previous upgrade exist, you must remove them before you begin an upgrade.

Even if you enable the CONVERSION_GUARD configuration parameter, you should still make level 0 backup of your files in case you need to revert after a successful upgrade or in case a catastrophic error occurs and you cannot revert.

Saving copies of the current configuration files

Save copies of the configuration files that exist for each instance of your source database server. Keep the copies available in case you decide to use the files after migrating or you need to revert to the source database server.

Although you can use an old ONCONFIG configuration file with Informix Version 12.10, you should use the new Version 12.10 ONCONFIG file, or at least examine the file for new parameters. For information about Version 12.10 changes to the ONCONFIG file, see Chapter 17, "Configuration parameter changes by version," on page 17-1.

Configuration files that you might have are listed in Table 3-1.

Table 3-1. Configuration files to save from the source database server

UNIX or Linux	Windows
$INFORMIXDIR/etc/$ONCONFIG	**%INFORMIXDIR%\etc\%ONCONFIG%**
$INFORMIXDIR/etc/onconfig.std	**%INFORMIXDIR%\etc\onconfig.std**
$INFORMIXDIR/etc/oncfg*	**%INFORMIXDIR%\etc\oncfg***
$INFORMIXDIR/etc/sm_versions	**%INFORMIXDIR%\etc\sm_versions**
$INFORMIXDIR/aaodir/adtcfg	**%INFORMIXDIR%\aaodir\adtcfg.***
$INFORMIXDIR/dbssodir/adtmasks	**%INFORMIXDIR%\dbssodir\adtmasks.***
$INFORMIXDIR/etc/sqlhosts or **$INFORMIXSQLHOSTS**	**%INFORMIXDIR%\etc\sqlhosts** or **$INFORMIXSQLHOSTS**
$INFORMIXDIR/etc/tctermcap	
$INFORMIXDIR/etc/termcap	

If you use ON-Bar to back up your source database server and the logical logs, you must also save a copy of any important storage manager files and the following file:

UNIX or Linux:
$INFORMIXDIR/etc/ixbar.servernum

Windows:
%INFORMIXDIR%\etc\ixbar.servernum

The IBM Informix Primary Storage Manager does not use the `sm_versions` file. If you plan to use the Informix Primary Storage Manager, you do not need the `sm_versions` file. However, if you use the Tivoli® Storage Manager or a third-party storage manager, you do need the `sm_versions` file.

If you are using a different directory as **INFORMIXDIR** for the new database server, copy `sm_versions` to the new **$INFORMIXDIR/etc**, or copy `sm_versions.std` to `sm_versions` in the new directory, and then edit the `sm_versions` file with appropriate values before starting the migration.

Preparing 12.10.xC2 BSON columns with DATE fields for upgrade

Before you upgrade from Informix 12.10.xC2, you must unload binary JSON (BSON) columns with DATE fields into JSON format so that you can load them into a later version of Informix 12.10.

Perform the following steps on the 12.10.xC2 server.

1. Create an external table with a similar name as the original table and with JSON (instead of BSON) format for the date. For example, assume that the original table named **datetab** has a BSON column named i that has DATE fields in it. Use the following statement to create an empty, external table named **ext_datetab** that has a JSON column with DATE fields. The DATAFILES clause specifies the location and name of the delimited data file, which in this example is `disk:/tmp/dat.unl`.

   ```
   create external table ext_datetab (j int, i json) using
           (datafiles ("disk:/tmp/dat.unl"),
           format "delimited");
   ```

2. Unload the data from the original table into the external table. For example:

   ```
   insert into ext_datetab select j, i::json from datetab;
   ```

Complete other pre-migration steps. After you upgrade to the new server, you must load the JSON columns with DATE fields from the external table into a new table in BSON format.

Related tasks:

"Finish preparing earlier versions of 12.10 databases for JSON compatibility" on page 6-6

Related information:

CREATE EXTERNAL TABLE Statement

Closing all transactions and shutting down the source database server

Before migrating, terminate all database server processes and shut down your source database server. This lets users exit and shuts down the database server gracefully. If you have long running sessions, you must also shut those down.

Inform client users that migration time is typically five to ten minutes. However, if migration fails, you must restore from a level-0 backup, so ensure that you include this possibility when you estimate how long the server will be offline.

Before you migrate from the original source database server, make sure that no open transactions exist. Otherwise, fast recovery will fail when rolling back open transactions during the migration.

To let users exit and shut down the database server gracefully

1. Run the **onmode –sy** command to put the database server in quiescent mode.
2. Wait for all users to exit.
3. Run the **onmode –l** command to move to the next logical log.
4. Run the **onmode -c** to force a checkpoint.
5. Make a level-0 backup of the database server.
6. Run the **ontape -a** command after the level-0 backup is complete.
7. Run the **onmode –yuk** command to shut down the system.

If you need to perform an immediate shutdown of the database server, run these commands:

```
onmode -l
onmode -c
onmode -ky
```

Initiating fast recovery to verify that no open transactions exist

A shutdown procedure does not guarantee a rollback of all open transactions. To guarantee that the source database server has no open transactions, put the source database server in quiescent mode and initiate fast recovery.

Run the following command to enter quiescent mode and initiate a fast recovery:

```
oninit -s
```

UNIX/Linux Only

On UNIX or Linux, the **oninit –s** command rolls forward all committed transactions and rolls back all incomplete transactions since the last checkpoint and then leaves a new checkpoint record in the log with no open transactions pending.

You must run the **oninit -s** command before you initialize the new version of Informix. If any transactions remain when you try to initialize the new database server, the following error message appears when you try to initialize the new database server, and the server goes offline:

```
An open transaction was detected when the database server changed log versions.
Start the previous version of the database server in quiescent mode and then shut
down the server gracefully, before migrating to this version of the server.
```

For more information about fast recovery, see your *IBM Informix Administrator's Guide*.

After you put the database server in quiescent mode and initiate fast recovery, issue the **onmode -yuk** command to shut down the database server. Then review the **online.log** file for any possible problems and fix them.

Only after proper shutdown can you bring the new database server (Informix Version 12.10) through the migration path. Any transaction that is open during the migration causes an execution failure in fast recovery.

Verifying the integrity of the data

After verifying that no open transactions exist, verify the integrity of your data by running the **oncheck** utility. You can also verify the integrity of the reserve pages, extents, system catalog tables, data, and indexes. If you find any problems with the data, fix the problems before you make a final backup of the source database server.

To obtain the database names, use the following statements with DB-Access:

```
DATABASE sysmaster;
SELECT name FROM sysdatabases;
```

Alternatively, to obtain the database names, run the **oncheck -cc** command without any arguments and filter the result to remove unwanted lines, as shown in this example:

```
oncheck –cc | grep "ting database"
```

Table 3-2 lists the **oncheck** commands that verify the data integrity.

Table 3-2. Commands for verifying the data integrity

Action	oncheck Command
Check reserve pages	**oncheck -cr**
Check extents	**oncheck -ce**
Check system catalog tables	**oncheck -cc** *database_name*
Check data	**oncheck -cD** *database_name*
Check indexes	**oncheck -cI** *database_name*

Related information:
The oncheck Utility

Verifying that the database server is in quiescent mode

Before you make a final backup, verify that your source database server is in quiescent mode.

Run the **onstat -** command to verify that the database server is in quiescent mode.

The first line of the onstat output shows the status of your source database server. If the server is in quiescent mode, the status line includes this information:

```
Quiescent -- Up
```

Making a final backup of the source database server

Use ON-Bar or **ontape** to make a level-0 backup of the source database server, including all storage spaces and all used logs. After you make a level-0 backup, also perform a complete backup of the logical log, including the current logical-log file.

Be sure to retain and properly label the tape volume that contains the backup.

Important: You must also make a final backup of each source database server instance that you plan to convert.

For ON-Bar, remove the **ixbar** file, if any, from the **$INFORMIXDIR%/etc** or **%INFORMIXDIR%\etc** directory after the final backup. Removing the **ixbar** file ensures that backups for the original source database server are not confused with backups about to be done for the new database server. Follow the instructions regarding expiration in your storage manager documentation.

For more information about making backups, see the *IBM Informix Backup and Restore Guide*.

Verifying that the source database server is offline

Before you install the new database server, verify that the source database server is offline. You must do this because the new database server uses the same files.

You cannot install the new database server if any of the files that it uses are active.

You can also use the **onstat** utility to determine that shared memory was not initialized.

Pre-migration checklist of diagnostic information

Before you migrate to a newer version of Informix, gather diagnostic information, especially if you have large, complex applications. This information will be useful to verify database server behavior after migration. This information will also be useful if you need help from IBM Software Support.

If you have problems, you or IBM Software Support can compare the information that you gather with information obtained after migration.

The following table contains a list of the diagnostic information that you can gather. You can print the checklist. Then, after you get the information specified in each row, check the second column of the row.

Table 3-3. Checklist of information to get before migrating

Information to Get Before Migrating	Done
Get the SQL query plans for all regularly used queries, especially complex queries, by using SET EXPLAIN ON.	
Run the **dbschema -d -hd** command for all critical tables. The output contains distribution information.	
Get **oncheck -pr** output that dumps all of the root reserved pages.	
Make a copy of the ONCONFIG configuration file. A copy of the ONCONFIG file is essential if you need to revert to an earlier version of the database server. In addition, a copy of this file is useful because **oncheck -pr** does not dump all of the configuration parameters.	
Prepare a list of all the environment variables that are set using the **env** command.	
During times of peak usage: • Obtain an **online.log** snippet, with some checkpoint durations in it • Run **onstat -aF, -g all**, and **-g stk all**.	
During times of peak usage, run the following **onstat** commands repeatedly with the **-r repeat** option for a period of about three to five minutes: • **onstat -u**, to see the total number of **sqlexecs** used • **onstat -p**, for read and write cache rates, to detect deadlocks and the number of sequential scans • **onstat -g nta**, a consolidated output of **-g ntu**, **ntt**, **ntm** and **ntd** • **onstat -g nsc**, **-g nsd**, and **-g nss** for the status of shared memory connections • **onstat -P**, **-g tpf**, and **-g ppf** • **vmstat**, **iostat** and **sar**, for cpu utilization • **timex** of all queries that you regularly run	

Related tasks:

"Preparing for migration" on page 3-1

Migrating from 32-bit to 64-bit database servers

If you are migrating from a 32-bit version of Informix to a 64-bit version of Informix or reverting from a 64-bit version of Informix, you might need to follow additional steps to update certain internal tables.

These steps are documented in the platform-specific machine notes that are provided with your database server.

For 32- to 64-bit migrations, change SHMBASE and STACKSIZE according to the `onconfig.std` configuration file for the new version.

All UDRs and DataBlade modules that were built in 32-bit mode must be recompiled in 64-bit mode because they will not work with the 64-bit database server. If you have any UDRs that were developed in 32-bit mode, make sure that proper size and alignment of the data structures are used to work correctly on a 64-bit computer after recompiling in 64-bit mode. For more information, refer to the machine notes.

Migrating from 32-bit to 64-bit with collection types that use the SMALLINT data type

If you are moving your database from a 32-bit computer to a 64-bit computer and your database contains collection types that use the SMALLINT data type, you must take extra steps to prevent memory corruption. Collection types are the ROW, LIST, SET, and MULTISET data types. This restriction applies if you are upgrading from an older version of Informix on 32-bit to the current version of Informix on 64-bit, or if you are moving from 32-bit to 64-bit on the current version of Informix.

To migrate a database with SMALLINT collection types from 32-bit to 64-bit, use one of the following methods:

- Export and import the data.
  1. Export the data from the 32-bit computer.
  2. Import the data onto the 64-bit computer.
- Drop and recreate specific collection types and database objects.
  1. Drop the collection types that use the SMALLINT data type and all other database objects that reference them (such as tables, columns, SPL routines, triggers, indexes, and so on).
  2. Recreate the collections types and all the other necessary database objects.

Chapter 4. Enterprise Replication and migration

You must coordinate the migration of all servers that are involved in data replication.

These topics describe the additional tasks that you must perform when migrating to and reverting from Informix Version 12.10 if you are running Enterprise Replication.

Related concepts:

"Upgrading Informix (in-place migration)" on page 1-4

"Types of migration" on page 1-2

"Migrating Informix (non-in-place migration)" on page 1-5

Preparing to migrate with Enterprise Replication

If you use Enterprise Replication, you must do replication-related tasks to prepare for migration.

You must do all migration operations as user **informix**, unless otherwise noted.

Only a DBSA can run the **cdr check queue** command. With a non-root installation, the user who installs the server is the equivalent of the DBSA, unless the user delegates DBSA privileges to a different user.

To prepare for migration with Enterprise Replication:

1. Stop applications that are performing replicable transactions.
2. Make sure that the replication queues are empty.

   If you are migrating from Informix 12.10.xC1 or later releases, run the following commands to check for queued messages and transactions:

   a. **cdr check queue -q cntrlq** *targetserver*

   b. **cdr check queue -q sendq** *targetserver*

   c. **cdr check queue -q recvq** *targetserver*

   If you are migrating from an earlier version of Informix, run the following commands:

   a. Run **onstat -g grp** to ensure that the Enterprise Replication grouper does not have any pending transactions. The grouper evaluates the log records, rebuilds the individual log records in to the original transaction, packages the transaction, and queues the transaction for transmission.

   b. Run **onstat -g rqm** to check for queued messages.
3. Shut down Enterprise Replication by running the **cdr stop** command.

Now you can complete the steps in "Preparing for migration" on page 3-1 and, if necessary, in "Migrating from 32-bit to 64-bit database servers" on page 3-10.

Related information:

Enterprise Replication Event Alarms

cdr check queue

onstat -g grp: Print grouper statistics

onstat -g rqm: Prints statistics for RQM queues

Migrating with Enterprise Replication

If you use Enterprise Replication, you must complete replication-related tasks when you migrate to a new version of Informix. If you are converting to Informix 12.10.xC4 or later from an earlier fix pack in the same release, you also have to complete these tasks.

Prerequisites:

- Complete the steps in "Preparing for migration" on page 3-1.
- Perform all migration operations as user **informix**.
- All servers in the Enterprise Replication domain must be available.

To migrate with Enterprise Replication:

1. Perform the tasks that are described in "Migrating to the new version of Informix" on page 6-1, including starting the new version of the server.
2. For each node involved in Enterprise Replication, back up the **syscdr** databases by using the **dbexport -ss** command or the **dbschema -ss** command and the UNLOAD statement, or by a combination of these methods. The **-ss** option prevents backup tables from using default extent sizes and row-level locking, which is not an appropriate lock mode with Enterprise Replication.
3. Make sure that no replicable transactions occur before Enterprise Replication starts.
4. If you are upgrading to a new release, run the conversion script, named `concdr.sh`, in the `$INFORMIXDIR/etc/conv` directory on UNIX, or `concdr.bat`, in the `%INFORMIXDIR%\etc\conv` directory on Windows. Do not run the script when you migrate between fix packs of the same release except where noted.

   To convert to 12.10.xC4 or later:

   UNIX: `% sh concdr.sh` *`from_version`* `12.10.xC4`

   Windows: `concdr.bat` *`from_version`* `12.10.xC4`

   The valid *from_version* values are: `12.10.xC3`, `12.10.xC2`, `12.10.xC1`, `11.70`, `11.50`, `11.10`, and `10.00`.

   Because version 12.10.xC4 is the latest fix pack with conversion, specify `12.10.xC4` even if you are upgrading to later a fix pack version, such as 12.10.xC6.

   To convert to earlier fix packs of 12.10:

   UNIX: `% sh concdr.sh` *`from_version`* `12.10`

   Windows: `concdr.bat` *`from_version`* `12.10`

   The valid *from_version* values are: `11.70`, `11.50`, `11.10`, and `10.00`.
5. Ensure conversion completed successfully. The script prints messages and conversion details to standard output, and stores the information in the following file:
   - UNIX: `$INFORMIXDIR/etc/concdr.out`
   - Windows: `%INFORMIXDIR%\etc\concdr.out`

   Important: If you receive the following message, you must resolve the problems reported in the `concdr.out` file, restore the **syscdr** database from backup, and then start from step 1.

   ```
   'syscdr' conversion failed.
   ```

   When you receive the following message, conversion is complete and you can go to the next step.

```
'syscdr' conversion completed successfully.
```

6. After successful conversion, start Enterprise Replication by running the **cdr start** command.
7. If you upgraded the servers in a grid from version 11.70 to version 12.10 and you want to copy external files to the servers in the grid, you must enable the ability to copy external files. To enable the copying of external files, run this command:

   ```
   cdr modify grid grid_name --enablegridcopy server_groupname
   ```

Important: After you convert to the new version of Informix with Enterprise Replication, do not drop the **syscdr** database. If **syscdr** is dropped, you cannot revert to the older database server with Enterprise Replication because the data required to carry out the reversion is stored in the **syscdr** database.

Related information:

cdr modify grid

Conversion and Reversion Messages for Enterprise Replication

Reverting with Enterprise Replication

If you use Enterprise Replication, you must complete replication-related tasks when you revert from the new version of Informix. If you are reverting from Informix 12.10.xC4 or later to a fix pack earlier than 12.10.xC4 in the same release, you also have to complete these tasks.

Prerequisites:

- Perform all reversion operations as user **informix**.
- Enterprise Replication must be running, or you must delete the replication server before you revert.
- All servers in the Enterprise Replication domain must be available.
- Replication queues must be nearly empty.

If you want to revert to a version earlier than when Enterprise Replication was defined on this server, you must remove Enterprise Replication from this server before reverting. After you remove Enterprise Replication, you can revert your server using the instructions at Chapter 7, "Reverting from Informix Version 12.10," on page 7-1.

To revert from Version 12.10 with Enterprise Replication:

1. Release or remove any grid statements that are deferred from propagation by running the **ifx_grid_release()** or **ifx_grid_remove()** function.
2. Stop applications that are doing replicable transactions.
3. Remove Enterprise Replication features from the current release that cannot be reverted. For more information, see "Reversion requirements and limitations" on page 7-2.
4. Run the **onstat -g cat repls** command to check whether if Enterprise Replication is in alter mode. If so, run the **cdr alter --off** command.
5. Delete shadow replicates.
6. Back up the **syscdr** databases with **dbschema** or UNLOAD.
7. Run the reversion script, named `revcdr.sh`, in the `$INFORMIXDIR/etc/conv` directory on UNIX, or `revcdr.bat`, in the `%INFORMIXDIR%\etc\conv` directory on Windows:

   To revert from 12.10.xC4 or later to an earlier version:

UNIX: `% sh revcdr.sh from_version 12.10.xC4`

Windows: `revcdr.bat from_version 12.10.xC4`

Valid *from_version* values are 12.10.xC4, 12.10.xC5, and 12.10.xC6.

Because version 12.10.xC4 is the latest fix pack with conversion, specify `12.10.xC4` even if you are reverting from a later fix pack version, such as 12.10.xC6.

Valid *to_version* values are `12.10.xC3`, `12.10.xC2`, `12.10.xC1`, `11.70`, `11.50`, `11.10`, and `10.00`. You do not have to specify a fix pack level except where noted.

To revert from earlier 12.10 fix packs:

UNIX: `% sh revcdr.sh 12.10 to_version`

Windows: `revcdr.bat 12.10 to_version`

Valid *to_version* values are `11.70`, `11.50`, `11.10`, and `10.00`.

This script runs a reversion test followed by the actual Enterprise Replication reversion.

Important: If the reversion test or actual reversion fails, check the file `$INFORMIXDIR/etc/revtestcdr.out` or `revcdr.out`. Resolve any problems before going to the next step.

8. Perform database server reversion tasks, as described in "Reverting from Informix Version 12.10" on page 7-12.
9. Run **onmode -l** and **onmode -c** to prevent the database server from failing when you start Enterprise Replication.
10. Start Enterprise Replication by running the **cdr start** command.

Related tasks:

"Preparing to revert" on page 7-1

Related information:

Deleting a Replication Server

cdr modify grid

Conversion and Reversion Messages for Enterprise Replication

Chapter 5. High-availability cluster migration

You must coordinate the migration and reversion of all servers that are involved in high-availability clusters. You can use a rolling upgrade in some cases to update servers while the cluster is online, with minimal interruption to client applications. Otherwise, you must schedule cluster downtime to upgrade the servers. A cluster must be offline to reverse an upgrade or revert to an earlier release.

A rolling upgrade can minimize downtime, but the tradeoff is that you must spend time to prepare for a rolling upgrade. The effort to prepare your servers for a rolling upgrade depends on how closely your current configuration matches the procedure requirements. In some cases, you might find it easier to plan for downtime during a period of low activity instead of setting up your environment for a rolling upgrade. The downtime that is required depends on your system, but smaller clusters usually require less downtime.

Use the following table to help you determine which upgrade procedure to use. Also, review the requirements and limitations that are documented in each procedure.

Table 5-1. Comparison of upgrade procedures for high-availability clusters

Upgrade to	Procedure	Use	Procedure overview
Next consecutive fix pack or PID of the same major version	"Rolling upgrade of an online cluster to the next fix pack or PID (UNIX, Linux)" on page 5-4	As of Informix 12.10.xC5, you can apply the next consecutive fix pack or interim fix (PID) of the same major version to all the servers while the cluster remains online.	You must stop and restart each server in the cluster, including the primary. Specifically, you upgrade each secondary server, and then you stop the primary server and promote an upgraded secondary server to primary. Next, you upgrade the original primary server, bring it online as a secondary server, and promote it back to primary, if necessary. Interruption to client applications is minimized because transactions are redirected to active servers by Connection Manager or through the client applications. The new database server capabilities can be used in the cluster after all servers are upgraded.

Table 5-1. Comparison of upgrade procedures for high-availability clusters (continued)

Upgrade to	Procedure	Use	Procedure overview
Any later fix pack or PID of the same major version	"Upgrading an offline cluster to a fix pack or PID" on page 5-7	You can use this procedure within a major version to apply a fix pack or PID in offline clusters in the following situations: • Your cluster does not meet the requirements for a rolling upgrade. • The limitations that are imposed by a rolling upgrade are impractical for your environment. • You prefer or need to bring the servers in the cluster offline before you upgrade them.	You stop all servers in the cluster during a period when downtime is acceptable. While the cluster if offline, you upgrade all the servers. You then start the primary followed by the secondary servers. You don't have to rebuild the cluster or clone the servers.
New major version A fix pack or PID that requires conversion	"Migrating an offline cluster to a new major version" on page 5-8	You can use this procedure to migrate the servers in your offline cluster to a new major version. For example, you can migrate from Informix 11.70 to Informix 12.10. Also, you can use this procedure to apply a fix pack or PID that requires standard conversion procedures. Usually conversion is not required for a fix pack or PID. The machine notes indicate whether conversion is required.	You stop the servers in a specific order during a period when planned downtime is acceptable. Then, you migrate only the primary server. During migration, the database server automatically removes secondary servers. After you migrate the primary server, you must rebuild the cluster by recreating all secondary servers. You can use the **ifxclone** utility to recreate secondary servers.

Table 5-1. Comparison of upgrade procedures for high-availability clusters (continued)

Upgrade to	Procedure	Use	Procedure overview
Any supported release	"Rolling upgrade of an online cluster with Enterprise Replication" on page 5-10	This alternative rolling upgrade procedure requires a working knowledge of Enterprise Replication. You can use this procedure to upgrade online clusters to any supported product release. You can use this procedure to upgrade to a new major version or to apply any fix pack or PID (not just the next consecutive one) within a release. This procedure is more flexible than the other rolling upgrade procedure; however, it is more complex to set up.	You temporarily convert the primary and secondary servers to stand-alone Enterprise Replication servers. The upgrade occurs without incurring any downtime because Enterprise Replication supports replication between different versions of the server software.

Related concepts:

"Upgrading Informix (in-place migration)" on page 1-4

"Types of migration" on page 1-2

"Migrating Informix (non-in-place migration)" on page 1-5

Preparing to migrate, upgrade, or revert clusters

If you use high-availability clusters, you must coordinate the migration of all of the servers that are involved in a high-availability cluster, and you must perform additional steps when preparing to migrate.

Prerequisites:

- Perform all migration operations as user **informix**.
- Download the product package from IBM Passport Advantage® at http://www.ibm.com/software/howtobuy/passportadvantage, or download recommended fixes for server products.
- If you are migrating to a new version of the server, complete all steps in "Preparing for migration" on page 3-1.

To prepare for migration or reversion of a cluster:

1. Prepare each server in the cluster:
   a. Install the target server software in a different location from where the source database server software is installed. Do not install the target server software over the source server.

      Tip: Install the new version of IBM Informix Client Software Development Kit (Client SDK), which contains the Connection Manager that you must use with the new version of the server. If you want to use only the

Connection Manager from the new version of Client SDK, install Client SDK in a new location and use the Connection Manager from that location.

b. Copy the `onconfig` and `sqlhosts` configuration files to the target installation directory (for example, **$INFORMIXDIR/etc**).

c. Install on the target server any user-defined objects or DataBlade modules that are used on the source server.

2. Back up your primary server. You can perform this step in the following ways:
   - Use ON–Bar or **ontape** to make a level-0 backup on the primary source server.
   - If you have a high-availability cluster with a High-availability Data Replication (HDR) secondary server, you can use the HDR secondary server as a standby server for any contingencies that occur while you upgrade the primary server. However, if it is necessary to use an HDR secondary server as a standby server for contingencies, do not perform updates on the standby server while migration or reversion is in progress, because the updates cannot be replicated and will be lost. Additionally, nonlogged objects on the primary server will not exist on the secondary server.

     Attention: Do not use RS secondary servers as backup servers, because transactions could be lost.

Rolling upgrade of an online cluster to the next fix pack or PID (UNIX, Linux)

As of Informix 12.10.xC5, you can apply the next consecutive fix pack or interim fix (PID) to your current version of the database server. During the rolling upgrade, the cluster remains online even though the servers in the cluster run different levels of the software. The new capabilities can be used in the cluster after all the servers in the cluster are upgraded.

About this procedure

This rolling upgrade procedure works only on UNIX and Linux platforms. Use this procedure to apply the next *consecutive* fix pack or PID in the current major version. For example, you can do a rolling upgrade from 12.10.xC4 to 12.10.xC5. Otherwise, you must use a different procedure that is documented at Chapter 5, “High-availability cluster migration,” on page 5-1.

Do *not* use this procedure in the following situations:

- To apply a fix pack or PID that requires conversion.
- To upgrade to 12.10.xC5 from 12.10.xC3, 12.10.xC2, or 12.10.xC1.
- To upgrade an earlier major version of the server to a later major version of the database server, for example, to upgrade from version 11.70 to 12.10.
- To upgrade from a patch release or special build, unless advised to do so by IBM Software Support.

You must stop and restart each server in the cluster, including the primary, as part of this procedure. Specifically, you upgrade each secondary server, and then you stop the primary server and promote an upgraded secondary server to primary. Next, you upgrade the original primary server, bring it online as a secondary server, and promote it back to primary, if necessary.

You must have the following permission on all the servers in the cluster: user **root** or user **informix**.

This procedure consists of these steps:

- "Prepare for a rolling upgrade"
- "Upgrade the servers"
- "Return the cluster to its original configuration" on page 5-7

Prepare for a rolling upgrade

Use the following steps to plan for and prepare the servers for rolling upgrade:

1. Complete the steps in "Preparing to migrate, upgrade, or revert clusters" on page 5-3, which include installing the new software on all the servers in the cluster, copying the appropriate configuration files, and backing up the primary server.
2. Configure client redirection to minimize interruption of service.

   Set up redirection and connectivity for clients by using the method that works best for your environment.

   If Connection Manager controls the connection redirection in the cluster: Ensure that every service level agreement (SLA) definition in the Connection Manager configuration file can redirect to at least one server other than the one you are about to update. For example, assume that you have an SLA with only one secondary. Before you upgrade the secondary server in that SLA, update the SLA to include the cluster primary (PRI).
3. Ensure that the primary server has an appropriate amount of disk space for the logical log records that are created during the entire upgrade process. The space that is required depends on your environment.

   Attention: If a log wrap occurs during the rolling upgrade procedure, you must apply the fix pack or PID while the cluster is offline.

   Tip: Examine the online log to get an estimate of your data activity during normal operations. You might want to ensure that you have enough space for data activity for a day. Also, you might find it convenient to plan the rolling upgrade for a period of low traffic.
4. Prepare the secondary server that will become the primary when you upgrade the original primary server. You must use an SD secondary or a fully synchronous HDR secondary server that has transactional consistency with the original primary server.
   a. If the cluster contains an SD secondary server, you don't need to do any additional preparation to that server.
   b. If the cluster contains an HDR secondary server, make sure that it runs in fully synchronous (SYNC) mode.
   c. If the cluster contains only RS secondary servers in addition to the primary server, you must change one of the RS secondary servers to an HDR secondary server in SYNC mode.

Upgrade the servers

Follow the steps in this section to upgrade the cluster servers in the following order:

1. Remote standalone (RS) secondary server
2. HDR secondary server
3. Shared disk (SD) secondary server
4. Primary server

Important: Upgrade the primary server only after *all* the secondary servers are upgraded and tested. After you upgrade the primary server, if you want to revert to your original environment you must take the cluster offline.

1. Run the **onmode -c** command to force a checkpoint for each server.
2. If a wire listener is running on the server that you want to upgrade, stop that wire listener.
3. Stop the server that you want to upgrade. If you can wait for all connections to exit gracefully before stopping the server, use the **onmode -kuy** command. Otherwise, use the **onmode -ky** command to stop the server.
   - **When you stop a secondary server:** If redirection is configured for the cluster, the client application automatically connects to another active server in the cluster.
   - **When you stop the primary server:** If failover is configured for the cluster, a secondary server is promoted automatically to primary. Otherwise, you can run the **onmode -d make primary** command to promote a prepared secondary server to primary.

     Tip: If the primary is offline before the failover, you must use the **onmode -d make primary force** command.
4. Set your environment to use the fix pack or PID that you installed on the server.
   a. Set the **INFORMIXDIR** environment variable to the full path name for the target installation.
   b. Update all environment variables that depend on the **INFORMIXDIR** environment variable. At a minimum, update these environment variables: **PATH**, **DBLANG**, **INFORMIXSQLHOSTS**, and any platform-specific library path environment variables, such as **LD_LIBRARY_PATH**.
5. Start the upgraded server.

   To start an upgraded secondary server: Use the **oninit** command.

   To start an upgraded original primary server: Start the original primary server as a secondary server. For convenience, start it as the server type that was promoted to primary during the rolling upgrade. For example, if you promoted an HDR server to primary for the rolling upgrade, start the original primary as an HDR secondary server.
   - To start the upgraded server as an SD secondary server, run the **oninit -SDS** command.
   - To start the upgraded server as an HDR secondary server, run the **oninit -PHY** command, and then run the following command: **onmode -d secondary** *primary_server secondary_server*

   After the server starts, it runs the new version of the software and automatically reconnects to the cluster.
6. To verify that the upgraded secondary server is active in the cluster, run the **onstat -g cluster** command on both the server you upgraded and on the primary server.
7. If you stopped the wire listener to upgrade this server, restart the wire listener.

After you upgrade all the servers and restart them, the original primary server is running as a secondary server.

Return the cluster to its original configuration

Use the following steps if you want the cluster to operate as it did before you prepared it for a rolling upgrade.

1. Manually promote the secondary server that was the original primary to be the primary server again.
   a. Run the **onmode -c** command to force a checkpoint.
   b. Run the **onmode -d make primary** command to promote the secondary server to primary.
2. Undo any changes that you made when you prepared the servers for a rolling upgrade. Some of these optional steps might not apply to you.
   - Adjust the amount of disk space that is allocated for logical log records.
   - Convert the HDR secondary server back to an RS secondary server.
   - Change the HDR secondary server back to ASYNC mode from SYNC mode.
   - Change the Connection Manager SLA definitions.

Related tasks:

"Upgrading an offline cluster to a fix pack or PID"

Related information:

Configuring connection management

Fully synchronous mode for HDR replication

Redirection and connectivity for data-replication clients

onmode -c: Force a checkpoint

onmode -d: Set High Availability server characteristics

onmode -k, -m, -s, -u, -j: Change database server mode

The oninit utility

onstat -g cluster command: Print high-availability cluster information

Stopping the wire listener

Starting the wire listener

Upgrading an offline cluster to a fix pack or PID

You can bring a high-availability cluster offline to apply any PID or fix pack of the same version of the database server. For example, you must bring the clusters offline to upgrade the servers to the current fix pack if earlier fix packs were not applied to the server. This procedure is an alternative to the rolling upgrade procedure.

Prerequisites:

- Verify that you are upgrading to a PID or fix pack in which standard conversion procedures are not necessary. If the PID or fix pack requires you to complete standard conversion procedures, or if you want to upgrade to a new major release, go to "Migrating an offline cluster to a new major version" on page 5-8 instead of following the procedures in this topic.
- Complete the steps in "Preparing to migrate, upgrade, or revert clusters" on page 5-3.
- Perform all migration operations as user **informix**.

To upgrade offline clusters to a new PID or fix pack:

1. Stop the Connection Manager by issuing the **oncmsm -k** ***connection_manager_name*** command.

2. If you are using a High-availability Data Replication (HDR) secondary server as a backup server in case of contingencies:
   a. Quiesce the primary server by issuing an **onmode -sy** command to prevent user connections to the server.
   b. Force a checkpoint by issuing an **onmode –c** command on the primary server.
3. Stop secondary servers in the cluster in the following order:
   a. If you have remote standalone (RS) servers, stop them by issuing the **onmode -ky** command.
   b. If you have shared disk (SD) servers, stop them by issuing the **onmode -ky** command.
   c. If you have an HDR secondary server, stop it issuing the **onmode -ky** command.
4. Stop the primary server by issuing the **onmode -ky** command.
5. On each server, set the INFORMIXDIR environment variable to the full path name for the target installation.
6. Ensure that all of the necessary configuration files are available in the target installation.
7. Start the servers in the cluster and perform additional tasks in the following order:
   a. Start the primary server by running an **oninit** command.
   b. Wait for primary server to be in online (multi-user) mode.
   c. Start the Connection Manager by running an **oncmsm** command.
   d. Start the HDR secondary server by running an **oninit** command.
   e. Start SD servers by running an **oninit** command.
   f. Start RS servers by running an **oninit** command.

Related reference:

"Rolling upgrade of an online cluster to the next fix pack or PID (UNIX, Linux)" on page 5-4

Migrating an offline cluster to a new major version

To migrate a high-availability cluster to a new major version, you must stop the servers in a specific order, and then you migrate the primary server. During migration, the database server automatically removes secondary servers. After you migrate the primary server, you must rebuild the cluster by recreating all secondary servers. This procedure also applies if you want to upgrade a cluster to a new PID or fix pack that requires standard conversion procedures.

Prerequisites:

- Complete the steps in "Preparing for migration" on page 3-1.
- Complete the steps in "Preparing to migrate, upgrade, or revert clusters" on page 5-3.
- Perform all migration operations as user **informix**.

Be sure to stop and start the servers in the cluster in the order shown in the following procedure.

To migrate to a new version with high-availability clusters:

1. Stop the Connection Manager by issuing the **oncmsm -k** *connection_manager_name* command.
2. If you are using a High-availability Data Replication (HDR) secondary server as a backup server in case of contingencies:
   a. Quiesce the primary server by issuing an **onmode -sy** command to prevent user connections to the server.
   b. Force a checkpoint by issuing an **onmode –c** command on the primary server.
3. Stop the secondary servers in the cluster in the following order:
   a. If you have remote standalone (RS) secondary servers, stop them by issuing the **onmode -ky** command.
   b. If you have shared disk (SD) servers, stop them by issuing the **onmode -ky** command.
   c. If you have an HDR secondary server, stop it by issuing the **onmode -ky** command.
4. Stop the primary server by issuing the **onmode -ky** command.
5. On each server, set the INFORMIXDIR environment variable to the full path name for the target installation.
6. Ensure that all of the necessary configuration files are available in the target installation.
7. Optional: Enable quick reversion to a consistent restore point if the migration fails. Do this by setting the CONVERSION_GUARD and RESTORE_POINT_DIR configuration parameters. (For more information, see “Configuring for recovery of restore point data in case an upgrade fails” on page 3-4.)
8. Start the primary server by issuing an **oninit** command.
9. Ensure that the conversion to the target server was successful and that the server is in multi-user mode.
10. Start the Connection Manager by issuing an **oncmsm** command.
11. If you are migrating from pre-11.10 versions of Informix and need SD secondary servers on the primary server in a shared-disk cluster, set the primary server by issuing the **onmode -d set SDS primary** *primary_server_name* command.
12. Start SD secondary servers by issuing **oninit** commands.
13. Start the servers in the cluster and perform additional tasks in the following order:
14. Back up all logs. Then use ON–Bar or **ontape** to make a level-0 backup on the primary server to use to reestablish the RS and HDR secondary servers if necessary.
15. If you have RS secondary servers:
    a. Add RS entries on the primary server by issuing **onmode –d add RSS** *rss_server_name* commands.
    b. Start RS secondary servers with level-0 restore operations from the level 0 backup that was made on the primary server after migration.
    c. On RS secondary servers, run the **onmode -d RSS** *primary_server_name* command, and wait for the "`RSS secondary server operational`" message to appear after each command.
16. If you have an HDR secondary server:
    a. Reestablish the pair on the primary server by issuing an **onmode -d primary** *hdr_secondary_server_name* command.

b. Start the HDR secondary server with level-0 restore operations from the level 0 backup that was made on the primary server after migration.
c. On the HDR secondary server, run the **onmode -d secondary** *primary_server_name* command, and wait for the "HDR secondary server operational" message to appear after each command.

17. Perform any additional standard migration tasks described in "Migrating to the new version of Informix" on page 6-1 and in "Completing required post-migration tasks" on page 6-5.
18. If you have Connection Manager configuration files that you created with a version of IBM Informix Client Software Development Kit (Client SDK) that is prior to version 3.70.xC3, you must convert the files. You must convert them because the older files are incompatible with the current version of the Connection Manager. For more information, see Converting older formats of the Connection Manager configuration file to the current format.

The migration of all servers in the cluster is now complete.

Rolling upgrade of an online cluster with Enterprise Replication

You can perform a rolling upgrade in a high-availability cluster by temporarily converting the primary and secondary servers to stand-alone Enterprise Replication servers. The upgrade occurs without incurring any downtime because Enterprise Replication supports replication between different versions of the server software. You can use this approach to upgrade to a new major version, or to apply fix packs or interim fixes (PIDs).

During this procedure, you convert the primary server and the secondary servers to standalone Enterprise Replication servers. You then upgrade the software on the secondary server, stop Enterprise Replication, and then clone the server using the **ifxclone** command.

See the following link for additional information about upgrading clusters: http://www.ibm.com/developerworks/data/library/techarticle/dm-1012rollingupgrade/index.html.

The following prerequisites apply when upgrading software on a cluster:

- Non-logged databases are not supported.
- Raw or unlogged tables are not supported.
- Typed tables are not supported unless the typed table contains a primary key.
- UDTs that do not support Enterprise Replication are not supported.
- The CDR_QDATA_SBSPACE configuration parameter must be set on both the primary and secondary servers.
- The `sqlhosts` file must define a server group.
- The primary and secondary servers must belong to different groups.
- For versions of Informix software earlier than 11.50.xC7, converting a primary and secondary server pair to Enterprise Replication is not supported if a table does not have a primary key.
- For versions of Informix software earlier than 11.10, the **sec2er** command is not supported.

If you are upgrading Informix software version 11.50.xC7 or later, the **sec2er** command adds a primary key to any table that does not already have one defined. For large tables, adding the primary key can take a long time, during which you

will not see any server activity. In addition, the **sec2er** command requires exclusive access to the table while adding the primary key and user transactions will be blocked from accessing the table. You might want to manually create primary keys on any large table before running the **sec2er** command. If you have tables that were created with the DELIMIDENT environment variable set, and the tables do not have primary keys, then you must manually create the primary keys for those tables before running the **sec2er** command.

There are different steps involved in the upgrade process depending on whether you are using the Connection Manager:

- For high-availability clusters that use the Connection Manager to redirect user connections:

  There are two options you can choose based on your requirements. You can:

  – Add a new Connection Manager instance to manage user connections while the cluster is upgraded. This involves configuring a new 3.70 Connection Manager instance that supports Enterprise Replication and has corresponding changes to the `sqlhosts` file or other connection mechanisms for user applications. If users already have a Connection Manager group support infrastructure to manage their user connections, they can easily add the new Connection Manager for Enterprise Replication to their existing Connection Manager group to ensure that no user connection downtime occurs during the upgrade process.

  – Use your existing cluster Connection Manager or Connection Manager groups throughout the upgrade process, without making any changes to the Connection Manager configuration, applications, or application connection mechanisms. This option has a 10-second down time for user connections, but if that is acceptable, you can avoid the overhead of adding a new Connection Manager instance and the configuration changes that go with it.

- For clusters not using the Connection Manager to redirect user connections:

  Users must take steps to move user connections to the appropriate servers during the upgrade process.

Performing a server upgrade when the Connection Manager is not in use

In this example, the terms *server1* and *server2* refer to server names rather than machine names.

Some additional steps are required to upgrade Informix software:

1. On the primary server (**server1**), perform a check to see whether the servers can be split into Enterprise Replication servers by running the following command:

   ```
   cdr check sec2er -c server1 --print server2
   ```

   The command examines the primary and secondary servers and determines if it is possible to convert them to Enterprise Replication. The command displays warnings and errors that explain conditions that may prevent the servers from converting to Enterprise Replication. The `–print` option prints the commands that will be run when the **cdr start** command runs. You should fix any warnings or errors and then run the command again before performing the next step.

2. Run the following command from an Informix 11.70 or later server:

   ```
   cdr start sec2er -c server1 server2
   ```

   The **sec2er** command converts the primary and secondary servers into standalone servers and configures and starts Enterprise Replication. Enterprise

Replication keeps the data on the servers synchronized; however, any table created after the **sec2er** command is run will not be replicated.

3. On the former secondary server (server2), upgrade the Informix software. The steps to upgrade the server are as follows:
   a. Stop replication by running the following command:
      ```
      cdr stop
      ```
   b. Back up the logical logs:
      ```
      ontape -a
      ```
   c. Stop the server that contains the older version of the Informix software:
      ```
      onmode -kuy
      ```
   d. Log on to the server with the newly installed Informix software.
   e. Start the server and let the conversion complete successfully :
      ```
      oninit
      ```
   f. Run the concdr.sh script to convert the syscdr database from the old software version to the new version:
      ```
      concdr.sh old_version new_version
      ```
   g. Start replication on the former secondary server (**server 2**) after it has been upgraded:
      ```
      cdr start
      ```

   Because Enterprise Replication supports replication between dissimilar versions of the server software, the upgraded secondary server (**server2**) replicates data with the former primary server (**server1**), so that data updates are replicated on both servers.
4. Move client application connections from the former primary server (**server1**) to the upgraded server (**server2**).
5. On the primary server (**server1**) use the **onmode -k** command to take the database server to offline mode.
   ```
   onmode -k
   ```
6. On the former secondary server (**server2**) run the following command to stop Enterprise Replication:
   ```
   cdr stop
   ```
7. You can now clone the upgraded server to set up the other secondary servers in your cluster. Clone the newly upgraded server (**server2**) by running the **ifxclone** utility on **server1**. Use the **-d** (disposition) parameter to create a standalone, RSS, or HDR secondary server. In the following examples, assume that the TCP/IP address for **server1** is 192.168.0.1 on port 123, and the address for **server2** is 192.168.0.2 on port 456.
   - To create a standalone server:
     ```
     ifxclone -T -S server2 -I 192.168.0.2 -P 456 -t server1
              -i 192.168.0.1 -p 123
     ```
   - To create an RS secondary server, specify the disposition by using the **-d RSS** option:
     ```
     ifxclone -T -S server2 -I 192.168.0.2 -P 456 -t server1
              -i 192.168.0.1 -p 123 -d RSS
     ```
   - To create an HDR secondary server, specify the disposition by using the **-d HDR** option:
     ```
     ifxclone -T -S server2 -I 192.168.0.2 -P 456 -t server1
              -i 192.168.0.1 -p 123 -d HDR
     ```

At this point, the cluster is running on the upgraded server. Clients can move applications from server2 if necessary.

Performing a server upgrade when the Connection Manager is in use

Refer to the following steps when clients are using the Connection Manager without a Connection Manager group defined in the existing setup.

For this example, assume that the following Connection Manager configuration file is defined:

```
NAME cm1
LOG 1
LOGFILE /tmp/cm1.log

CLUSTER cluster1
{
   INFORMIXSERVER ids1,ids2
   SLA oltp DBSERVERS=primary
   SLA webapp DBSERVERS=HDR
   SLA report DBSERVERS=(primary,HDR)
   FOC ORDER=ENABLED PRIORITY=1
}
```

1. On the primary server (**server1**), perform a check to see whether the servers can be split into Enterprise Replication servers by running the following command:

   ```
   cdr check sec2er -c server1 --print server2
   ```

   When the above command is run, the primary and secondary servers are examined to determines whether it is possible to convert them to Enterprise Replication. The command displays warnings and errors that explain conditions that might prevent the servers from converting to Enterprise Replication. The **–print** option prints the commands that will be run when the **cdr start sec2er** command runs. You should fix any warnings or errors and then run the command again before performing the next step.

2. Reload the Connection Manager so that it directs all client connections to the primary server. Here is the revised Connection Manager configuration file:

   ```
   NAME cm1
   LOG 1
   LOGFILE /tmp/cm1.log

   CLUSTER cluster1
   {
      INFORMIXSERVER ids1,ids2
      SLA oltp DBSERVERS=primary
      SLA webapp DBSERVERS=primary,HDR
      SLA report DBSERVERS=primary,HDR
      FOC ORDER=ENABLED PRIORITY=1
   }
   ```

3. Run the following command from an Informix 11.70 or later server:

   ```
   cdr start sec2er -c server1 server2
   ```

   The **sec2er** command converts the primary and secondary servers into standalone servers and configures and starts Enterprise Replication. Enterprise Replication keeps the data on the servers synchronized; however, any table created after the **sec2er** command is run will not be replicated.

4. On the former secondary server (**server2**), upgrade the Informix software.

   Because Enterprise Replication supports replication between dissimilar versions of the server software, the upgraded secondary server (**server2**) replicates data with the former primary server (**server1**), so that data updates are replicated to both servers.

5. Move client application connections from the former primary server (**server1**) to the upgraded server (**server2**).

a. Create a new Connection Manager configuration file for Enterprise Replication. The following shows a sample Enterprise Replication Connection Manager configuration file. The SLA names are same as for **cm1**:

```
NAME cm2
LOG 1
LOGFILE /tmp/cm2.log
MACRO list=g_server2,g_server1

REPLSET replset_1
{
   INFORMIXSERVER g_server1,g_server2
   SLA oltp DBSERVERS=${list}
   SLA webapp DBSERVERS=${list}
   SLA report DBSERVERS=${list}
}
```

The Enterprise Replication Connection Manager must define a replicate set that includes all replicates that are generated by the **sec2er** command. You can see the list of replicates by running the following command:

```
cdr list repl
```

You create a replicate set by running the following command:

```
cdr def replset replset_name repl1 repl2 ...
```

In the above example, repl1 and repl2 are replicates created by the **sec2er** command.

b. Halt the **cm1** Connection Manager instance and load the cm2 instance.

Performing the above step ensures that client connections are redirected to **group_2** (because **server2** belongs to **group_2**).

Here is a sample `sqlhosts` file:

```
#dbservername   nettype    hostname   servicename   options
g_server1       group      -          -             i=10
ids1            onsoctcp   host1      port1         g=g_server1
g_server2       group      -          -             i=20
ids2            onsoctcp   host2      port2         g=g_server2

oltp            onsoctcp   host1      port3
webapp          onsoctcp   host1      port4
report          onsoctcp   host1      port5
```

6. On the primary server (**server1**) use the **onmode -k** command to take the database server to offline mode.

```
onmode -k
```

7. You can now clone the upgraded server to the other secondary servers in your cluster.

At this point in the upgrade process, the high-availability cluster is running on the upgraded server.

8. Shut down the **cm2** Connection Manager instance and start the **cm1** instance.
9. On the former secondary server (**server2**) run the following command to stop Enterprise Replication:

```
cdr stop
```

Related information:

Parameters and format of the Connection Manager configuration file

sqlhosts file and SQLHOSTS registry key options

cdr start

cdr stop

Start an automatic logical-log backup

Database server files

onmode -k, -m, -s, -u, -j: Change database server mode

The ifxclone utility

cdr check sec2er

cdr list replicate

cdr define replicateset

Errors and warnings generated by the sec2er command

The **sec2er** command checks several conditions before converting a primary and secondary server pair to an ER system. The following conditions are checked by the **sec2er** command; ER conversion will take place only if the following conditions are met:

- The group definition must use the `i=` option.
- The CDRID option must be the same on both the primary and secondary servers (The CDRID is the unique identifier for the database server in the Options field of the `sqlhosts` file).
- The `sqlhosts` files on the primary server must match the `sqlhosts` file on the secondary server. The **sec2er** command checks only the lines in the `sqlhosts` files that must to match to support ER.
- The database must not contain a typed table without a primary key.
- User-defined types (UDT) must have ER support.
- Tables must not be protected with label-based access control (LBAC).
- A secondary server must be defined.
- An **sbspace** for a stable queue must exist.
- You must be running Informix version 11.00 or later.

The following warnings might occur. Warnings do not always indicate a problem but should be addressed. A warning is generated if any of the following are true:

- The CDR_SERIAL configuration parameter is not set.
- The values for the CDR_SERIAL configuration parameter are the same on both the primary and secondary servers. Identical values can cause conflicts.
- The database has sequence generators. Because sequence generators are not replicated, if you replicate tables using sequence objects for update, insert, or delete operations, the same sequence values might be generated on different servers at the same time, leading to conflicts.
- The database is not logged.
- A table is not logged.
- The DBSPACE is more than 70-percent full.

If the **cdr start sec2er** command fails or is interrupted, you might see a message that is similar to this message:

```
ERROR:  Command cannot be run on pre-11.70 instance if ER is already running
```

If you receive this error, and you do not have the Connection Manager running, remove replication by running the **cdr delete server** command on both servers and then run the **cdr start sec2er** command again. If you have the Connection Manager running, then perform the following steps:

1. Shut down the Connection Manager.
2. Shut down ER using one of the following commands:

- **cdr delete server** *group*
- **cdr delete server** *server*

3. Start the Connection Manager.
4. Restart the **sec2er** command:

```
cdr start sec2er
```

Reverting clusters

If you have a high-availability cluster, you must complete additional tasks when you revert from the new version of Informix. You must revert only the primary database server.

The server automatically removes secondary servers during reversion. After reversion on the primary server is complete, you must recreate all HDR, RS, and SD secondary servers in a high-availability cluster.

Prerequisites:

- Determine if you can revert. See information in "Review the database schema prior to reversion" on page 7-2.
- Complete the steps in "Preparing to migrate, upgrade, or revert clusters" on page 5-3.
- Perform all reversion operations as user **informix**.

When you revert clusters, be sure to stop and start the servers in the cluster in the order shown in the following procedure.

To revert high-availability clusters:

1. Stop the Connection Manager by issuing the **oncmsm -k** *connection_manager_name* command.
2. If you are using a High-availability Data Replication (HDR) secondary server as a backup server in case of contingencies:
   a. Quiesce the primary server by issuing an **onmode -sy** command to prevent user connections to the server.
   b. Force a checkpoint by issuing an **onmode –c** command on the primary server.
3. Stop the servers in the cluster and perform the following tasks in the following order:
   a. If you have remote standalone (RS) servers, stop them by issuing the **onmode -ky** command.
   b. If you have shared disk (SD) servers, stop them by issuing the **onmode -ky** command.
   c. If you have a High-availability Data Replication (HDR) secondary server, stop it by issuing the **onmode -ky** command.
   d. Revert the standard server by issuing an **onmode -b** *target_IDS_version* command.
   e. Verify that reversion was successful and the server was stopped. If the reversion was not successful, check the message log for error messages, take appropriate action, and restart reversion.
4. On each server, set the INFORMIXDIR environment variable to the full path name for the target installation.

5. Ensure that all of the necessary configuration files are available in the target installation.
6. Perform any additional database server reversion tasks, as described in "Reverting from Informix Version 12.10" on page 7-12.
7. Start the primary server by issuing an **oninit** command.
8. Start the Connection Manager by issuing an **oncmsm** command
9. Start SD secondary servers by issuing **oninit** commands.
10. Back up all logs. Then use ON–Bar or **ontape** to make a level-0 backup on the primary server to use to reestablish the RS and HDR servers if necessary.
11. If you have RS secondary servers:
    a. Add RS entries on the primary server by issuing **onmode –d add RSS** *rss_server_name* commands.
    b. Start the RS secondary servers with level-0 restore operations from the level 0 backup that was made on the primary server after reversion.
    c. On the RS secondary servers, run the **onmode -d RSS** *primary_server_name* command, and wait for the "RSS secondary server operational" message to appear after each command.
12. If you have an HDR secondary server:
    a. Reestablish the HDR pair on the primary server by issuing an **onmode –d primary** *hdr_secondary_server_name* command.
    b. Start the HDR secondary server with level-0 restore operations from the level 0 backup that was made on the primary server after reversion.
    c. On the HDR secondary server, run the **onmode -d secondary** *primary_server_name* command, and wait for the "HDR secondary server operational" message to appear after each command.

The reversion of all servers in the cluster is now complete.

Related tasks:

"Preparing to revert" on page 7-1

Restoring clusters to a consistent point

You can restore the primary server in a high-availability cluster to a consistent point after a failed upgrade.

Prerequisites:

- Before you began the upgrade, you must have enabled quick reversion, according to information in "Configuring for recovery of restore point data in case an upgrade fails" on page 3-4.
- The server must be offline.

To restore the primary server in a cluster to a consistent point after a failed upgrade:

Run the **onrestorept** utility. For more information, see "Restoring to a previous consistent state after a failed upgrade" on page 6-4.

Alternatively, if you backed up your primary server or you prepared for using the High-availability Data Replication (HDR) secondary server as a backup server before you upgraded and the upgrade fails, you can take other steps to restore the cluster. See "Restoring a cluster from a backup archive" on page 5-18 or "Restoring a cluster from the HDR secondary server" on page 5-18.

Restoring a cluster from a backup archive

If you backed up the primary server before you migrated or reverted the cluster, you can restore the primary server from the backup archive if migration or reversion fails. After you restore the primary server, you must recreate the other servers in the high-availability cluster.

Prerequisite: You made a level-0 backup archive of the primary server before migration or reversion.

To restore a cluster from a level-0 backup archive:

1. Point your INFORMIXDIR, PATH, and any other relevant environment variables to the directory in which the original version of Informix was installed before you migrated or reverted.
2. Using the level-0 backup archive, perform a full restore of your primary server.
3. Recreate the rest of your high-availability cluster.

Restoring a cluster from the HDR secondary server

You can restore the primary server from the High-availability Data Replication (HDR) secondary server that you prepared to use as a backup server before you migrated or reverted the cluster. After you restore the primary server, you must recreate the other servers in the high-availability cluster.

Prerequisite: You prepared the HDR secondary server to use as a contingency backup server, according to information in "Preparing to migrate, upgrade, or revert clusters" on page 5-3.

To restore a cluster from the HDR secondary server:

1. Start the HDR secondary server by running an **oninit** command.
2. Change the secondary server to the primary server by running the **onmode -d make primary** *hdr_server_name* command.
3. If the server is in quiescent mode, change it to multi-user mode by running an **onmode -m** command.
4. Make a level-0 backup using the ON-Bar or **ontape** utility.
5. Recreate the rest of the high-availability cluster.

Chapter 6. Migrating to Informix Version 12.10

When you migrate to a new version of Informix, you must complete required migration and post-migration tasks.

Migrating to the new version of Informix

After you prepare your databases for migration, you can migrate to the new version of Informix.

- Read the release notes and the machine notes for any new information.
- Complete the steps in "Preparing for migration" on page 3-1.

To upgrade a Informix non-root installation, you must run the installation program as the same user who installed the product being upgraded.

If you are migrating the database server from a version that does not support label-based access control, users who held the DBA privilege are automatically granted the SETSESSIONAUTH access privilege for PUBLIC during the migration process. For more information about SETSESSIONAUTH, see the *IBM Informix Guide to SQL: Syntax*. For information about label-based access control, see the *IBM Informix Security Guide*.

Important: Do not connect applications to a database server instance until migration has successfully completed.

Review and complete all tasks that apply:

1. "Installing the new version of Informix" on page 6-2.
2. "Setting environment variables" on page 6-2.
3. "Customizing configuration files" on page 6-3.
4. "Adding Communications Support Modules" on page 6-3.
5. "Installing or upgrading any DataBlade modules" on page 6-4.
6. "Starting the new version of Informix" on page 6-4.

When the migration starts, the `online.log` displays the message `Conversion from version <version number> Started.`. The log continues to display start and end messages for all components. When the migration of all components is complete, the message `Conversion Completed Successfully` appears. For more information about this log, see "Migration status messages" on page 6-2.

After migration, see "Completing required post-migration tasks" on page 6-5 for information about preparing the new server for use.

Tip: After conversion to 12.10.xC4, all databases are JSON compatible.

If the log indicates that migration failed, you can either:

- Install the old database server and restore your database from a level-0 backup.
- Run the **onrestorept** utility to back out of the upgrade and restore files to a consistent state without having to restore from a backup. You can run this utility only if you set the configuration parameters that enable the utility. See "Restoring to a previous consistent state after a failed upgrade" on page 6-4.

Installing the new version of Informix

Install and configure the new version of Informix.

If possible, migrate on a database server dedicated to testing your migration before you migrate on your production database server.

Decide whether to upgrade on the same computer, known as an in-place migration, or an a different computer, known as a non-in-place migration and follow the appropriate process.

Important: Monitor the database server message log, `online.log`, for any error messages. If you see an error message, solve the problem before you continue the migration procedure.

Related concepts:

"Upgrading Informix (in-place migration)" on page 1-4

"Migrating Informix (non-in-place migration)" on page 1-5

Related information:

Preparing a response file

Migration status messages

When the migration starts, the **online.log** displays the message "Conversion from version <*version number*> Started." The log continues to display start and end messages for all components.

When conversions of all components are complete, the message "Conversion Completed Successfully" displays. This message indicates that the migration process completed successfully, but it does not guarantee that each individual database was converted successfully. The message log might contain more information about the success or failure of the migration of each individual database. If migration of a particular database fails, then try to connect to the database to find out the exact cause of the failure.

At the end of the migration of each individual database, Informix runs a script to update some system catalog table entries. The message log includes messages that are related to this script. The success or failure of the script does not prevent the usage of a database.

For information about any messages in the message log, see the *IBM Informix Administrator's Guide*.

Related information:

Conversion and reversion error messages

Setting environment variables

After you install the current version of Informix, verify that the **INFORMIXDIR**, **INFORMIXSERVER**, **ONCONFIG**, **PATH**, and **INFORMIXSQLHOSTS** (if used) environment variables are set to the correct values.

The client application looks for the **sqlhosts** file in the **etc** directory in the **INFORMIXDIR** directory. However, you can use the **INFORMIXSQLHOSTS** environment variable to change the location or name of the **sqlhosts** file.

The setting of the GL_USEGLU environment variable must match between the source and target server during migration.

Important: Before you start the Version 12.10 database server, you must set the DBONPLOAD environment variable to the name of the **pload** database if the name is not **onpload**, the default name.

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

Related information:

GL_USEGLU environment variable

Customizing configuration files

When you initialize the new version of Informix, which contains a new `onconfig.std` file, use the same configuration that the old database server used. After you observe the performance of new version, you can examine the new file for new configuration parameters that you might want to use and can you start to use the new and changed configuration parameters.

Set the ALARMPROGRAM configuration parameter to either nothing or **no_log.sh** to prevent the generation of errors if the logical log fills during the migration. For more details, see "Starting the new version of Informix" on page 6-4. After the migration, change the value of ALARMPROGRAM to **log_full.sh**.

If the ALARMPROGRAM configuration parameter is set to the script **alarmprogram.sh**, set the value of BACKUPLOGS in **alarmprogram.sh** to `N`.

Important: To facilitate migration (and reversion), use the same values for your new database server for ROOTOFFSET, ROOTSIZE, and ROOTPATH that you used for the old database server. Also, keep the same size for physical logs and logical logs, including the same number of logical logs, and the same **sqlhosts** file.

If you use custom-code files with the High-Performance Loader, set the HPL_DYNAMIC_LIB_PATH configuration parameter in the **plconfig** file to the location of the shared library. For example, the location of the shared library might be **$INFORMIXDIR/lib/ipldd11a.*SOLIBSUFFIX***, where *SOLIBSUFFIX* is the shared-library suffix for your operating system.

For information about how to configure Informix, see your *IBM Informix Administrator's Guide*. For information about how to tune the configuration parameters, see the *IBM Informix Performance Guide*.

Related reference:

Chapter 17, "Configuration parameter changes by version," on page 17-1

Related information:

onconfig Portal: Configuration parameters by functional category

Adding Communications Support Modules

For communications with clients, you can optionally use a Communications Support Module (CSM) with the current version of Informix. After you install the CSM components, create entries in the **concsm.cfg** file and in the options field of the **sqlhosts** file to configure the CSM.

Existing client applications do not need to be recompiled or relinked if your database server does not use CSMs. If your database server uses a CSM, client applications must relink with new Informix libraries. The client applications must install and configure the CSM.

For information about how to set up the CSM, see the *IBM Informix Administrator's Guide*.

Installing or upgrading any DataBlade modules

After you install the new version of Informix, you might need to install or upgrade any DataBlade modules that you want to add to the database server.

Register the DataBlade modules after you initialize the database server.

When you install Informix, the built-in extensions, such as TimeSeries, are installed and registered automatically. You do not need to perform any actions to upgrade these DataBlade modules, nor do you need to unload and load any data during migration.

Important: If the sysadmin database does not exist or the Scheduler is turned off, automatic registration does not occur. You must register each extension that you want to use by running the **SYSBldPrepare()** function.

Related information:

Registering with the SYSBldPrepare( ) function

Starting the new version of Informix

After installing the new database server, start the server. Do not perform disk-space initialization, which overwrites whatever is on the disk space.

Prerequisite: If you installed Informix as user **root**, you must switch to user **informix** before starting the server.

Important: Informix writes to the logical logs with the transactions that result from creating the **sysmaster** database. If you run out of log space before the creation of the **sysmaster** database is complete, Informix stops and indicates that you must back up the logical logs. After you back up the logical logs, the database server can finish building the **sysmaster** database. You cannot use ON-Bar to back up the logical logs because the database has not been converted yet. If you have ALARMPROGRAM set to **log_full.sh** in the ONCONFIG configuration file, errors are generated as each log file fills during the migration. Set the value of ALARMPROGRAM to either nothing or **no_log.sh** so that these errors are not generated. If your logical log does fill up during the migration, you must back it up with **ontape**, the only backup tool you can use at this point. Issue the **ontape -a** command.

Start the new version of Informix for the first time by running **oninit** command on UNIX or by using the **Service** control application on Windows.

As Informix starts for the first time, it modifies certain disk structures. This operation should extend the initialization process by only a minute or two. If your disks cannot accommodate the growth in disk structures, you will find a message in the message-log file that instructs you to run an **oncheck** command on a table. The **oncheck** utility will tell you that you need to rebuild an index. You must rebuild the index as instructed.

Restoring to a previous consistent state after a failed upgrade

If the CONVERSION_GUARD configuration parameter is enabled and an upgrade fails, you can run the **onrestorept** command to undo the changes that are made during the upgrade and restore Informix to a consistent state.

The following prerequisites must be met:

- The directory that is specified by the RESTORE_POINT_DIR configuration parameter contains the files that were stored during the failed upgrade attempt.
- The server must be offline before you run the **onrestorept -y** command.

To restore the server to a previous consistent state after a failed upgrade:

Run the **onrestorept -y** command, which displays prompts while the command runs. If you do not specify **-y**, you must respond to every prompt that appears.

Important: Do not start the server until the **onrestorept** utility finishes running. Starting the server before the **onrestorept** utility finishes running can damage the server, requiring the server to be restored from a backup copy.

After you restore the server to a consistent state, you can resume work in the source version of the server or find and fix the problem that caused the upgrade to fail.

Important: To start Enterprise Replication after the **onrestorept** utility restores the database server to a consistent state, you must use the **cdr cleanstart** command.

Before you attempt another upgrade, run the **onrestorept -c** command to remove the files in the directory that is specified in the RESTORE_POINT_DIR configuration parameter. After a successful upgrade, the server automatically deletes restore point files from that directory.

Related concepts:

Chapter 15, "The onrestorept utility," on page 15-1

Related tasks:

"Preparing for migration" on page 3-1

Completing required post-migration tasks

After you migrate, you must complete a series of post-migration tasks to prepare the new version of the server for use.

To complete post-migration tasks:

1. If you **do not** use Informix Primary Storage Manager: "For ON-Bar, copy the sm_versions file" on page 6-6.
2. "Finish preparing earlier versions of 12.10 databases for JSON compatibility" on page 6-6
3. "Optionally update statistics on your tables after migrating" on page 6-7.
4. "Review client applications and registry keys" on page 6-8.
5. "Verify the integrity of migrated data" on page 6-8.
6. "Back up Informix after migrating to the new version" on page 6-9.
7. "Tune the new version for performance and adjust queries" on page 6-9.
8. If you use specific features, you might have to perform additional post-migration tasks:
   - "Migrating with Enterprise Replication" on page 4-2
   - Chapter 5, "High-availability cluster migration," on page 5-1
   - "Register DataBlade modules" on page 6-9

Repeat the migration and post-migration procedures for each instance of Informix Version 12.10 that you plan to run on the computer.

Important: Do not connect applications to a database server instance until the migration has completed successfully. If a serious error occurs during the migration, you might need to revert to the previous version of the server, restore from a level-0 backup, and then correct the problem before restarting the migration tasks.

Related concepts:

Chapter 7, "Reverting from Informix Version 12.10," on page 7-1

Related reference:

Chapter 17, "Configuration parameter changes by version," on page 17-1

Chapter 16, "Environment variable changes by version," on page 16-1

For ON-Bar, copy the sm_versions file

After migration, if you plan to use a storage manager other than the IBM Informix Primary Storage Manager, copy your previous `sm_versions` file to use with ON-Bar. Informix Primary Storage Manager does not use the `sm_versions` file.

If you are using other storage managers, copy your previous `sm_versions` file from the old `$INFORMIXDIR/etc` directory to the new `$INFORMIXDIR/etc` directory.

Finish preparing earlier versions of 12.10 databases for JSON compatibility

To make databases that were created with earlier versions of Informix 12.10 JSON compatible, you must complete some post-migration steps.

1. Prepare any databases that were created in 12.10.xC1 for JSON compatibility.

   If you upgraded to 12.10.xC4 or later fixpacks, skip this step because all databases are made JSON compatible during conversion.

   If you upgraded to 12.10.xC3 or 12.10.xC2, complete these steps:

   a. Run the appropriate script on the upgraded server as user **informix** or as a user with DBA privileges.
      - Informix 12.10.xC3: `convTovNoSQL1210.sql`
      - Informix 12.10.xC2: `convTovNoSQL1210X2.sql`

      For example, in Informix 12.10.xC3, to make the **db_name** database JSON compatible, you would run the following command as user **informix** or as a user with DBA privileges:

      UNIX **dbaccess -e db_name** `$INFORMIXDIR/etc/convTovNoSQL1210.sql`

      Windows
      dbaccess -e db_name `%INFORMIXDIR%\etc\convTovNoSQL1210.sql`

   b. Configure and start the wire listener.
2. If you used the wire listener in 12.10.xC2 or 12.10.xC3, after you upgrade to 12.10.xC4 or later fixpacks you must drop and recreate any indexes that you created on your collections. You do not need to drop and recreate the index that is automatically created on the _id field of a collection.
3. If you had binary JSON (BSON) DATE fields in your documents in 12.10.xC2, you must load the data from the external table that you created before you upgraded to a later 12.10 fix pack. On the upgraded server:

a. Rename the table that contains the BSON column with DATE fields. For example, use the ALTER table statement to rename the table from **datetab** to **datetab_original**.
b. Create a new table that has the original table name. For example:
```
create table datetab(j int, i bson);
```
c. Load data into the new table from the external table that you created in your 12.10.xC2 server. During the load, convert the data from JSON format to BSON format. For example:
```
insert into datetab select j, i::json::bson from ext_datetab;
```
d. Verify that the data loaded successfully.
e. Drop the original, renamed table (for example, **datetab_original**) after you are certain that the data loaded successfully into the new table (for example, **datetab**).

4. If you used the wire listener in 12.10.xC2 with a database that has any uppercase letters in its name, after you upgrade to a later fix pack you must update your applications to use only lowercase letters in the database name.

Related tasks:

"Preparing 12.10.xC2 BSON columns with DATE fields for upgrade" on page 3-6

Related information:

Configuring the wire listener

Starting the wire listener

CREATE EXTERNAL TABLE Statement

Optionally update statistics on your tables after migrating

Optionally run UPDATE STATISTICS on your tables and on UDRs that perform queries, if you have performance problems after migrating to the new version of Informix.

An unqualified UPDATE STATISTICS statement includes no additional clauses:

```
UPDATE STATISTICS;
```

By default, an unqualified UPDATE STATISTICS statement updates the statistics in LOW mode for every permanent table in the database, including the system catalog tables.

You can run an UPDATE STATISTICS statement that includes only a FOR ROUTINE clause that specifies no routine name:

```
UPDATE STATISTICS FOR ROUTINE;
```

Running this statement reoptimizes the DML statement execution plans for every SPL routine in the database that operates on local tables.

Similarly, you can substitute the keyword FUNCTION for ROUTINE in the previous example to reoptimize execution plans only for SPL routines that return at least one value, or you can substitute the keyword FUNCTION for PROCEDURE to reoptimize execution plans only for SPL routines that return no value. In these cases, the database server does not update the statistics in the system catalog tables.

You do not need to run UPDATE STATISTICS statements on C or Java UDRs.

Review client applications and registry keys

After you migrate a database server on the same operating system or move the database server to another compatible computer, review the client applications and `sqlhosts` file or registry-key connections. If necessary, recompile or modify client applications.

Verify that the client-application version you use is compatible with your database server version. If necessary, update the `sqlhosts` file or registry key for the client applications with the new database server information.

If you have a 64-bit ODBC application that was compiled and linked with a version of IBM Informix Client Software Development Kit (Client SDK) that is prior to version 4.10, you must recompile the application after migrating. The SQLLEN and SQLULEN data types were changed to match the Microsoft 64-bit ODBC specification. Be sure to analyze any functions that take either of these data types to ensure that the correct type passes to the function. This step is crucial if the type is a pointer. Also note that in the ODBC specification, some parameters that were previously SQLINTEGER and SQLUINTEGER were changed to SQLLEN or SQLULEN.

For more information about interactions between client applications and different database servers, refer to a client manual.

Verify the integrity of migrated data

Open each database with DB-Access and use **oncheck** to verify that data was not corrupted during the migration process.

You can also verify the integrity of the reserve pages, extents, system catalog tables, data, indexes, and smart large objects, as Table 6-1 shows.

Table 6-1. Commands for verifying the data integrity

Action	oncheck Command
Check reserve pages	**oncheck -cr**
Check extents	**oncheck -ce**
Check system catalog tables	**oncheck -cc** *database_name*
Check data	**oncheck -cD** *database_name*
Check indexes	**oncheck -cI** *database_name*
Check smart large objects	**oncheck -cs** *sbspace_name*
Check smart large objects plus extents	**oncheck -cS** *sbspace_name*

If the **oncheck** utility finds any problems, the utility prompts you to respond to corrective action that it can perform. If you respond `Yes` to the suggested corrective action, run the **oncheck** command again to make sure the problem has been fixed.

The **oncheck** utility cannot fix data that has become corrupt. If the **oncheck** utility is unable to fix a corruption problem, you might need to contact IBM Software Support before your proceed.

Important: If the value of the MAX_FILL_PAGES configuration parameter is 1, you must run **oncheck -cD** for all tables that include variable length data types (VARCHAR, NVARCHAR, and LVARCHAR), and take the suggested corrective action to avoid warnings about resetting the bitmap mode.

Related information:

The oncheck Utility

Back up Informix after migrating to the new version

Use a backup and restore tool (ON-Bar or **ontape**) to make a level-0 backup of the new database server. Do not overwrite the tapes that contain the final backup of the old database server.

For more information, see the *IBM Informix Backup and Restore Guide*.

Important: Do not restore the backed up logical-log files from your old database server for your new database server.

Tune the new version for performance and adjust queries

After backing up the new server, you can tune the database server to maximize performance. If your queries are slower after the upgrade, there are steps you can take to adjust your configuration and queries.

If your queries are slower after an upgrade, find out what changed that affects your configuration and adjust your configuration and queries as necessary:

- Compare the default values in the new `onconfig.std` file to values in your previous installation, and make any necessary adjustments (see New configuration parameters).
- If you created sample queries for comparison, use them to analyze the performance differences between the old and new database servers and to determine if you need to adjust any configuration parameters or the layout of databases, tables, and chunks.
- If you changed your applications, check to see if the changes led to slower performance.
- If you changed your hardware, operating system, or network settings, determine if you need to adjust any related settings or environment variables.
- Make sure that you ran necessary update statistics after upgrading:

  Drop data distributions if necessary when upgrading

  Optionally update statistics on your tables after migrating

Related information:

Improving individual query performance

Register DataBlade modules

You must register any DataBlade modules that you installed.

Registration is the process that makes the DataBlade module code available to use in a particular database. For more information on how to use DataBlade modules, see the *IBM Informix DataBlade Module Installation and Registration Guide*.

Related information:

DataBlade Module Installation and Registration Guide

Chapter 7. Reverting from Informix Version 12.10

You can revert to the version of the database server from which you migrated. When you run the reversion utility, you specify the target server for reversion and then Informix checks your database. If necessary, Informix might tell you to drop new objects, before automatically converting your data into the target server.

If Informix cannot revert a database, Informix prevents reversion.

Normally, reversion takes only a few minutes.

If you used the new features of Version 12.10, reversion time is longer, because you must prepare your database and data for reversion, and you must remove the features that are not supported in the earlier version of the server. The more work you complete in the new version, the more time consuming the reversion. See "Preparing to revert" before you revert.

If you did not use any of the new features of Version 12.10 and you did not complete much work using the new server, you can run the reversion utility and modify the values of the configuration parameters. See "Reverting from Informix Version 12.10" on page 7-12.

Related tasks:

"Completing required post-migration tasks" on page 6-5

Preparing to revert

If you used Version 12.10, you must prepare your system for reversion to the pre-migration version of the database server.

Review and complete all tasks that apply:

1. "Review the database schema prior to reversion" on page 7-2.
2. "Check and configure available space for reversion" on page 7-8.
3. "Save copies of the current configuration files" on page 7-9.
4. "Save system catalog information" on page 7-9.
5. "Verify the integrity of the Version 12.10 data" on page 7-9.
6. "Back up Informix Version 12.10" on page 7-9.
7. Export or save your data.
8. To prevent reversion issues:
   a. "Resolve outstanding in-place alter operations" on page 7-10.
   b. If you have empty tables with no extents, drop those tables.
   c. Defragment partitions by using the SQL administration API.
9. "Remove unsupported features" on page 7-12.
10. "Remove new BladeManager extensions" on page 7-12.

If you use high-availability clusters or Enterprise Replication, you must complete extra tasks before you can revert to the pre-migration version of Informix.

Related tasks:

"Reverting clusters" on page 5-16

"Reverting with Enterprise Replication" on page 4-3
"Reverting from Informix Version 12.10" on page 7-12

Related information:

defragment argument: Dynamically defragment partition extents (SQL administration API)

Review the database schema prior to reversion

You must review your database schema to determine if reversion is possible. You can revert from Informix Version 12.10 to the database server from which you migrated, if you have not added any extensions to the Version 12.10 database server and you are not reverting from a newly created instance.

To review the database schema to determine if reversion is possible:

1. Run the **dbschema** utility command.

   For example, run the following command to display information about the database **db1**:

   ```
   dbschema -d db1 -ss
   ```

2. Determine if the schema file contains SQL statements that the earlier database server does not support.
3. Determine if the database contains features, such as long identifiers, that the earlier database server does not support. See Part 5, "New and changed features in Informix servers."
4. Determine if any new SPL routines have been created in Informix Version 12.10 or if any routines were imported using **dbimport**.
5. Determine if tables or indexes using expression fragmentation had expressions changed or new fragments added.
6. Identify any new triggers, procedures, or check constraints.

See "Reversion requirements and limitations" for limitations on reversion to previous databases and prerequisite steps you must take before you revert.

Reversion requirements and limitations

If you used the new database server, you must review a list of reversion requirements and limitations, and then complete any prerequisite tasks before you revert. If the reversion restrictions indicate that you must drop objects from the database, you can unload your data and then reload it in the prior database server.

Reversion requirements and limitations are described in the following tables:

- Table 7-1 Requirements and limitations when reverting to `any version` of the server
- Table 7-2 on page 7-3 Requirements and limitations when reverting to `a specific version` of the server

Table 7-1. Requirements and limitations when reverting to any version of the server.

Reversion requirement or limitation
Revert only to the version from which you migrated: If you need to revert, you must revert to the Informix version that was your source version before you migrated to Version 12.10.
New databases created in the new version of the server: If you created a **new** database in the new version of the server, you cannot revert the database back to an earlier version of the server. If the data is required, you can unload the data and reload it in the prior version of the server.

Table 7-1. Requirements and limitations when reverting to any version of the server (continued).

Reversion requirement or limitation
New procedures, expression-based fragmented tables, expression-based fragmented indexes, check constraints, and triggers: These cannot be reverted. You must remove any new procedures, fragmented tables, expression-based fragmented indexes, check constraints, and triggers. **Note:** Expression-based fragmentation includes fragment by expression, fragment by interval, and fragment by list.
New built-in routines: These cannot be reverted.
New configuration parameters or configuration parameters with new options: These cannot be reverted.
New or outstanding in-place alters: In-place ALTER TABLE statements performed in the new version of the server must not be outstanding against any table. Ensure that all in-place ALTER operations are complete. If the reversion process does not complete successfully because of in-place ALTER operations, the reversion process lists all the tables that have outstanding in-place alter operations. You must resolve outstanding in-place alter operations on each of the tables in the list before you can revert to the older database server. For more information, see "Resolve outstanding in-place alter operations" on page 7-10. **Important:** Any in-place alter operation that was completed in a version that is before the current version will successfully revert.

Table 7-2. Requirements and limitations when reverting to a specific version of the server.

Reversion requirement or limitation	If reverting to the listed server or earlier servers

Tenant databases: Before you revert, identify all tenant databases and remove them.
 	
To display the names of all tenant databases (**tenant_dbsname**), you can query the tenant table in the sysadmin database. For example, run the following SELECT statement as user **informix**:
`SELECT tenant_dbsname FROM tenant;`
 	
You cannot remove this type of database with the DROP DATABASE statement. You must run the **admin()** or **task()** SQL administration API function with the **tenant drop** argument. For example, to remove a tenant database called **mydb**, run the following command with DBA or TENANT privileges:
`database sysadmin;`
`execute function task("tenant drop", "mydb");`
	12.10.xC3

JSON compatibility: Databases that were not JSON compatible before conversion to 12.10.xC4 are not compatible after reversion. However, if you revert to 12.10.xC2 or 12.10.xC3, you can run a script to make the databases JSON compatible.	12.10.xC3

Spatial index on JSON or BSON documents: You must drop **spatial** indexes that index JSON or BSON columns. Run the following SQL statement to identify which indexes you must drop:
`select idxname from sysindices`
`where substring_index(substring_index((indexkeys::lvarchar),'<',-1),'>',1) in`
`(select procid from sysprocedures where paramtypes::lvarchar like 'bson' or`
`paramtypes::lvarchar like 'bson,%' or paramtypes::lvarchar like '%,bson,%' or`
`paramtypes::lvarchar like '%,bson') and`
`amid = (select am_id from sysams where am_name = 'rtree');`
	12.10.xC3

Table 7-2. Requirements and limitations when reverting to a specific version of the server (continued).

Reversion requirement or limitation	If reverting to the listed server or earlier servers

Basic text search index on JSON or BSON documents: You must drop **bts** indexes that index JSON or BSON columns. Run the following SQL statement to identify which indexes you must drop:
`select idxname from sysindices`
`where substring_index(substring_index((indexkeys::lvarchar),'[',-1),']',1)`
`in (select opclassid from sysopclasses`
`where opclassname in ('bts_json_ops','bts_bson_ops','bts_longlvarchar_ops'));`
	12.10.xC3

Time series with BSON columns: You must remove any time series with BSON columns before you revert. Run the following SQL statement to identify the time series that you must remove:
`select fieldname from sysattrtypes`
`where type = 40 and extended_id in (`
`  select extended_id from sysxtdtypes`
`  where name in (`
`  select substring_index(substring_index((description::lvarchar),'(',-1),')',1)`
`  from sysxtddesc`
`  where extended_id in (`
`  select extended_id from sysxtdtypes`
`  where type = ( select type from sysxtdtypes`
`  where name = 'timeseries')`
`)));`
	12.10.xC3

Packed time series data: You must delete time series instances that contain compressed or hertz time series data. Run the following SQL statement to identify which rows in the time series table contain packed data: `SELECT id FROM tsinstancetable WHERE bitand(flags, '16') = 16;` Then delete the rows with packed elements from the time series table.	12.10.xC2
Predefined spatial reference systems: If you used a predefined SRID that was added for 12.10.xC3, after you revert you must manually insert the SRID into the **spatial_references** table or delete the data that is associated with the SRID.	12.10.xC2
Patch for reverting to 12.10.xC1 with time series data: A patch is required if you have time series data and you reverted to 12.10.xC1. Before you start 12.10.xC1, install patch `patch-idsdb00493404.tar`. You can download the patch from the IBM Support Portal.	12.10.xC1 only
LATERAL keyword in SPL routines: You must drop all SPL routines that include the LATERAL keyword.	12.10.xC1, 11.70.xC7 or earlier
Enterprise Replication shard servers: Before reverting, you must first remove all shard servers from participation in sharded clusters.	12.10.xC1
Enterprise Replication key specified by the --anyUniqueKey or --key options: You must remove any Enterprise Replication replicates that include the **--anyUniqueKey** or **--key** options to define the replication key.	11.70.xC7
Serial processing of Enterprise Replication replicates: You must remove any Enterprise Replication replicates that include the **--serial** option.	11.70.xC7
Data marts: You must drop all of the data marts. If you created data mart definitions by using workload analysis, you must drop all of the tables that were created by the `probe2Mart()` procedure.	11.70
Compressed B-tree indexes: You must uncompress or drop compressed B-tree indexes before you revert.	11.70
Compressed simple large objects in dbspaces: You must uncompress or drop compressed simple large objects in dbspaces before you revert.	11.70
Enterprise Replication on a server that is owned by a non-root user: You must remove Enterprise Replication from a server that is owned by a non-root user.	11.70

Table 7-2. Requirements and limitations when reverting to a specific version of the server (continued).

Reversion requirement or limitation	If reverting to the listed server or earlier servers
Enterprise Replication and TimeSeries data types: You must remove a participant that includes a **TimeSeries** data type.	11.70
Enterprise Replication send-only participants: You must remove a participant that includes the send-only option.	11.70
Grids enabled with the cdr modify grid command with the --enablegridcopy option: If you upgraded servers in a grid from version 11.70, before reverting, you must disable the ability to copy external files by the **cdr modify grid** command with the **--disablegridcopy** option.	11.70
Time series rolling window containers: You must remove rolling window containers.	11.70
Replicated time series instances: Time series instances that are replicated by Enterprise Replication have large IDs. You must remove any time series instances that have an instance ID that is larger than a 4-byte signed integer. You must also remove the containers in which these time series instances are stored. Run this SQL statement to find these instances: `SELECT * FROM tsinstancetable WHERE id > 2147483647;`	11.70
User-defined access methods with parameter descriptors: You must delete any user-defined access methods that include parameter descriptors.	11.70
External tables and empty tables: You can revert to 11.50.xC6 and later versions, if there is sufficient space to allocate extents. **Important:** If your data contains special delimiter characters, note that the following releases have different default behaviors in the CREATE EXTERNAL TABLE statement: 11.70: The default is ESCAPE OFF. 12.10: The default is ESCAPE ON. If the server does not have the space for allocating extents for new external and empty tables, you must drop the objects before reverting. Similarly, before you revert to version 11.50.xC5 or earlier versions, you must drop all external tables. The SYSEXTERNAL, SYSEXTCOLS, and SYSEXTDFILES system catalog tables will be dropped automatically during reversion.	11.70
Time series containers and tables with large page sizes: You cannot revert time series tables and containers that have a page size other than the default size. You must drop all time series tables and containers with large pages sizes before you revert. (You can unload the tables and drop the tables and containers before you revert, and then later recreate the containers and reload the tables.)	11.70.xC2
Time series containers and time series data type names longer than 18 bytes: You cannot revert time series containers and time series data types that have names that are longer than 18 bytes. You must drop all tables that have time series data types with long names and drop all time series containers that have long names before you revert. (You can unload the tables and drop the tables and containers before you revert, and then later recreate the containers and reload the tables.)	11.70.xC2

Time series virtual tables: You must drop all time series virtual tables that were created by the TSCreateExpressionVirtualTab procedure and returned by this query before you revert:
`SELECT a.tabname FROM systables a, systabamdata b`
`WHERE LENGTH(b.am_param) > 256 AND a.tabid = b.tabid;`
	11.70.xC2

Informix Warehouse Accelerator reversion requirements: If you use the Informix Warehouse Accelerator and need to revert, see Reversion requirements for an Informix warehouse server and Informix Warehouse Accelerator in the *IBM Informix Warehouse Accelerator Administration Guide*.	11.70.xC2
Databases created as NLSCASE INSENSITIVE: You cannot revert databases that were created as NLSCASE INSENSITIVE. You must drop all databases that were created with the NLSCASE INSENSITIVE property before you revert.	11.70.xC1

Table 7-2. Requirements and limitations when reverting to a specific version of the server (continued).

Reversion requirement or limitation	If reverting to the listed server or earlier servers
Forest of trees indexes: If you created forest of trees indexes, you must drop them before you revert.	11.50
A dbspace that exceeds 2147483647 pages: If the total size of a dbspace exceeds 2147483647 base pages (for example, 4 terabytes for a 2K page size, 8 terabytes for a 4K page size), reversion will fail. If this happens, you must reorganize your dbspaces and chunks so that the total size of an individual dbspace does not exceed 2147483647 base pages.	11.50
Interval and list fragmentation strategies: Any table or index with interval or list fragmentation strategy must be dropped before reversion.	11.50
The sysfragdist table and related schema changes: The **sysfragdist** system catalog table and changes to the schema or to the encoding of other system catalog tables to support fragment level statistics and fragmentation strategies will be dropped during reversion.	11.50
Sequence objects: You can revert these unless the server does not have the space for allocating extents for new sequence objects. If the server flags these objects because it cannot revert them, you must use the DROP SEQUENCE statement to drop from the database any sequence objects that the database server flags.	11.50
Disabled foreign key indexes: You must drop these and recreate the affected constraints without the index disabled option before you can revert.	11.50
MULTI_INDEX, STAR_JOIN, and related query optimizer directives: These are not supported after reversion.	11.50
Disabled replication server: Before reverting, you must enable or delete the replication server.	11.50
Master server for quality of data: Before reverting, you must stop monitoring the quality of data or define a new master server for quality of data.	11.50
Grid member: Before reverting, you must remove the server from the grid.	11.50
ERKEY shadow columns: Before reverting, you must drop the ERKEY shadow columns by running the ALTER TABLE statement with the DROP ERKEY clause.	11.50
UDRs that use the SET ENVIRONMENT RETAINUPDATELOCKS syntax: Before reverting, you must drop these UDRs.	11.50.xC5
MERGE statements that include the Delete clause: Before reverting, you must drop these routines.	11.50.xC5
Reversion if you have high-availability clusters: Before reverting, see "Reverting clusters" on page 5-16.	11.50.xC5
MERGE statements: Before reverting , you must drop any routines that use the MERGE statement.	11.50.xC4
SELECT statements that include the CONNECT BY clause: Before reverting you must drop any routines that use queries or subqueries that include the CONNECT BY clause, and drop any views that are defined by SELECT statements that include the CONNECT BY clause. After reversion, SYS_CONNECT_BY_PATH( ) is not supported as a built-in routine.	11.50.xC4
ifx_replcheck shadow column: Before reverting, you must drop the ifx_replcheck shadow column.	11.50.xC4
Compressed tables and compressed table fragments: You must uncompress or drop compressed tables and fragments before reverting.	11.50.xC3
UDRs that use methods or SQL statements that reference savepoints: You must drop these UDRs, because they include new SQL syntax that earlier Informix versions do not support. (Before you can compile these UDRs, you must rewrite their error-handling code, so that no savepoint objects are referenced.)	11.50.xC2
New indexes in sbspaces: If you built indexes in sbspaces so you could search the sbspaces with the Basic Text Search DataBlade module, you must drop the indexes before reverting.	11.50.xC2

Table 7-2. Requirements and limitations when reverting to a specific version of the server (continued).

Reversion requirement or limitation	If reverting to the listed server or earlier servers
Version columns in tables: If you have version columns in tables, you must remove them.	11.10
BIGINT and BIGSERIAL columns: If you have any BIGINT or BIGSERIAL columns, you must modify or remove them.	11.10
Extended data types or attributes based on BIGINT and BIGSERIAL data types: If you have these, you must remove them.	11.10
Casts based on BIGINT and BIGSERIAL data types: If you have these, you must remove them.	11.10
Components installed with the custom installation option: If you installed components with the custom installation option, you can uninstall a component only if you are not breaking any component dependencies.	11.10
Java UDRs that were compiled with newer versions of Java software development kit: These UDRs must be recompiled with the earlier version of the Java software development kit. For details, see "Recompile Java user-defined routines" on page 7-14.	11.10
Subqueries in DELETE and UPDATE statements: If a condition with a subquery in the WHERE clause of DELETE or UPDATE references the same table that the DELETE or UPDATE statement modifies, before you revert, you must rewrite the INSERT or DELETE operation as two separate SQL statements: • A SELECT statement that returns qualifying rows of the original table to a temporary table • A DELETE or INSERT statement that modifies the original table by inserting or deleting rows that match rows in the temporary table	11.10
Returned data type from CONCAT and other SQL string-manipulation functions: Because these built-in functions now support promotion of their return value to longer data types, some operations on VARCHAR or NVARCHAR values might fail with overflow error -881 after reversion.	11.10
Automatic update statistics feature: Informix versions that are earlier than version 11.10.xC1 do not support the Scheduler. Therefore, the functionality of the Automatic Update Statistics feature, which is implemented by the Scheduler, is not available after reversion. To enforce any Automatic Update Statistics policies that you intend to apply to your databases, you must manually issue the corresponding UPDATE STATISTICS statements after reversion to Version 10.00 or to an earlier version.	10.00
ANSI joins in distributed queries: Distributed queries that use ANSI-compliant LEFT OUTER syntax for specifying joined tables and nested loop joins run more efficiently in Version 10.00.UC4 than in earlier releases. This occurs through sending the query to each participating database server for operations on local tables of those servers. If you revert from Version 10.00.UC4 or later to an earlier release that does not support this implementation of the ANSI-compliant syntax, such queries might show reduced performance, because the database server instance from which the query originates will perform the joins locally.	10.00.xC4
The INDEX_SJ and AVOID_INDEX_SJ optimizer directives: When queries explicitly use the new INDEX_SJ and AVOID_INDEX_SJ optimizer directives, these directives have no effect when the query runs. You must run UPDATE STATISTICS on stored procedures to force re-compilation of stored procedures. In addition, reversion removes the effect of these directives in SAVE EXTERNAL DIRECTIVES statements and on output from the SET EXPLAIN statement. If you revert to a version of the database server that supports the **sysdirectives** system catalog table, but does not support the AVOID_INDEX_SJ or INDEX_SJ directives, user **informix** must delete any active row of **sysdirectives** that includes AVOID_INDEX_SJ or INDEX_SJ in the **directives** column.	10.00
sysdbopen( ) and sysdbclose( ) procedures: Earlier versions of the database server do not support these procedures, and any UDRs with these names are not automatically started.	10.00

Table 7-2. Requirements and limitations when reverting to a specific version of the server (continued).

Reversion requirement or limitation	If reverting to the listed server or earlier servers
UDRs include a collection-derived table in the FROM clause of a query: These will not work correctly after reversion to an earlier release.	10.00
Multiple BEFORE, FOR EACH ROW and AFTER triggers for the same INSERT, UPDATE, DELETE, or SELECT event on a table or view, and trigger routine UDRs: Before reverting, you must drop any of the following triggers and UDRs, if they exist in the database: • Delete triggers defined on the same table or defined on a view as another Delete trigger • Insert triggers defined on the same table or defined on a view as another Insert trigger • Update triggers defined on the same table or view (or on the same subset of columns) as another Update trigger • Select triggers defined on the same table or same subset of columns as another Select trigger • Trigger routines defined with the FOR TRIGGER keywords • Triggers that use the DELETING, INSERTING, SELECTING, or UPDATING operators in their triggered action	10.00
Cross-server operations on BOOLEAN, LVARCHAR, or DISTINCT columns: If you revert to a database server version that does not support cross-server operations on BOOLEAN, LVARCHAR, or DISTINCT columns in databases, applications that use this feature will fail.	10.00
sysadmin database: This database is automatically dropped during reversion.	10.00
Queries that use SKIP and LIMIT: Version 10.00.xC3 supports queries that use the keywords SKIP and LIMIT. A query that uses either of these keywords will fail with an error after reversion to any earlier version of the database server.	10.00
FIRST clause with an ORDER BY clause: Version 10.00.xC3 supports the ORDER BY clause of the SELECT statement in a subquery whose result set is a collection-derived table (CDT), but only in conjunction with the SKIP keyword or the FIRST keyword (or its keyword synonym LIMIT) in the Projection clause of the same SELECT statement. Queries that use this syntax will fail with an error after reversion to an earlier version of the database server.	10.00
Label-based access control (LBAC): Before reverting, you must drop any security policy from tables. In addition, because IDSSECURITYLABEL is a new built-in type for Version 11.10, you must remove any columns of that type before you can revert to versions that are earlier than Version 11.10.	10.00
Support for Distributed Relational Database Architecture™ (DRDA): Informix drops stored procedures for metadata that the database server created automatically. You cannot manually drop these built-in stored procedures.	10.00

If you migrated to an interim version of the database server before you migrated to Version 12.10 and you need to revert, see additional reversion requirements and limitations in the *IBM Informix Migration Guide* that is included in the documentation set for the interim version of the database server.

Check and configure available space for reversion

You must be sure you have enough space for reversion to the source database server.

The tblspace **tblspace** pages can be allocated in non-root chunks. If the root chunk is full and tblspace **tblspace** pages were allocated in non-root chunks, make sure you have enough space in the root chunk of the target database server.

To determine how many pages were allocated and where they were allocated, run **oncheck -pe** and look for the word `TBLSpace`. This space must be available on the device where the root chunk will be located.

For information about space requirements for Informix Version 12.10, see "Checking and configuring available space" on page 3-2.

Related concepts:

"Checking and configuring available space" on page 3-2

Save copies of the current configuration files

Save copies of the ONCONFIG and **concsm.cfg** files for when you migrate to Informix Version 12.10 again.

Informix uses the **concsm.cfg** file to configure CSMs.

Save system catalog information

If your current database server instance uses secure-auditing masks or external spaces, and you want to preserve the associated catalog information, you must unload these system catalog tables before you revert.

Run the following command to unload the system catalog tables:

```
$INFORMIXDIR/etc/smi_unld
```

When the **smi_unld** utility finishes unloading the information, the utility displays instructions for reloading the information. Save these instructions. After you complete the reversion and bring up your database server, you can reload the data that you preserved. Follow the instructions given with the **smi_unld** utility for reloading the information. Typically, you run the following command:

```
$INFORMIXDIR/etc/smi_load $INFORMIXDIR/etc/
```

Verify the integrity of the Version 12.10 data

Verify the integrity of your Version 12.10 data, if you did not do this after you migrated.

To verify the integrity of your data, run the following commands:

```
oncheck -cI database_name
oncheck -cD database_name
oncheck -cr
oncheck -cc database_name
```

If the **oncheck** utility finds any problems, the utility prompts you to respond to corrective action that it can perform. If you respond `Yes` to the suggested corrective action, run the **oncheck** command again to make sure the problem has been fixed.

The **oncheck** utility cannot fix data that has become corrupt. If the **oncheck** utility is unable to fix a corruption problem, you might need to contact Technical Support before your proceed.

You will also need to verify the integrity of your data after you revert.

Back up Informix Version 12.10

Before you begin the reversion, make a complete level-0 backup of Informix Version 12.10.

For more information, see the *IBM Informix Backup and Restore Guide*.

Resolve outstanding in-place alter operations

You must resolve outstanding in-place alter operation before you revert to a previous version of the database server. An in-place alter is outstanding when data pages still exist with the prior definition.

Run an **oncheck -pT** command for each table to see whether you have outstanding in-place alter operations. If the reversion process detects oustanding in-place alter operations, reversion fails and the reversion process lists all the tables that have outstanding in-place alter operations.

If you are reverting from version 12.10.xC4 or later, you can remove in-place alter operations by running the **admin( )** or **task( )** SQL administration command with the **table update_ipa** or **fragment update_ipa** argument. You can include the **parallel** option to run the operation in parallel. For example, the following statement removes in-place alter operations in parallel from a table that is named **auto**:

```
EXECUTE FUNCTION task('table update_ipa parallel','auto');
```

If you are reverting from an earlier version of 12.10, you can resolve outstanding in-place alter operations by running dummy UPDATE statements. Dummy UPDATE statements force any outstanding in-place alter operations to complete by updating the rows in the affected tables. To generate a dummy UPDATE statement, create an UPDATE statement in which a column in the table is set to its own value. This forces the row to be updated to the latest schema without changing column values. Because the database server always alters rows to the latest schema, a single pass through the table that updates all rows completes all outstanding in-place alter operations.

The dummy UPDATE statement differs from a standard UPDATE statement because it does not change the data. A standard UPDATE statement usually changes the value of the affected row.

For example, to create a dummy update, specify:

```
UPDATE tab1 SET col1=col1 WHERE 1=1 ;
```

You must ensure that the column selected is a numeric data type (for example, INTEGER of SMALLINT) and not a character data type.

If a table is large, a single update of the whole table can cause a long transaction. To avoid a long transaction, update the table in pieces, by ranges of some column, with this statement:

```
... WHERE {id_column} BETWEEN {low_value} AND {step_value}
```

For example, specify:

```
UPDATE tab1 SET col1=col1 WHERE col1 BETWEEN 1 AND 100;
UPDATE tab1 SET col1=col1 WHERE col1 BETWEEN 101 AND 200;
```

Ensure that the UPDATE statements include the entire data set.

If the table is replicated with Enterprise Replication, the database server replicates all updated rows unnecessarily. To avoid replication, update the table as follows:

```
BEGIN WORK WITHOUT REPLICATION;
     ...
     COMMIT WORK;
```

When all the pending in-place alter operations are resolved, run the **oncheck -pT** command again for each table. In the output of the command, check information in the `Version`section. The number of data pages should match with current version. Also, all other table versions should have `count=0` for the number of data pages that the version is accessing.

For example, if you run the **oncheck -pT testdb:tab1** command after outstanding in-place alter operations are resolved, you might see information similar to the information in this segment of sample output:

```
TBLspace Report for testdb:root.tab1

  Physical Address               1:860
  Creation date                  06/23/2011 14:23:08
  TBLspace Flags                 800801     Page Locking
                                            TBLspace use 4 bit bit-maps
  Maximum row size               29
  Number of special columns      0
  Number of keys                 0
  Number of extents              1
  Current serial value           1
  Current SERIAL8 value          1
  Current BIGSERIAL value        1
  Current REFID value            1
  Pagesize (k)                   2
  First extent size              8
  Next extent size               8
  Number of pages allocated      8
  Number of pages used           4
  Number of data pages           3
   << Number of data pages used is 3 >>
  Number of rows                 6
  Partition partnum              1048981
  Partition lockid               1048981

  Extents
       Logical Page     Physical Page     Size Physical Pages
                  0            1:1895        8          8
TBLspace Usage Report for testdb:root.tab1

  Type                   Pages      Empty  Semi-Full       Full  Very-Full
  ---------------- ---------- ---------- ---------- ---------- ----------
  Free                       4
  Bit-Map                    1
  Index                      0
  Data (Home)                3
                    ----------
  Total Pages                8

  Unused Space Summary

     Unused data slots                              177

  Home Data Page Version Summary

    Version                                  Count

      3 (oldest)                            0
          << Other version should show data page count=0>>
      4                                     0
```

```
    << Other version should show data page count=0>>
5 (current)                          3
    << Current should always match the number of data pages>>
```

Related information:

Global pool

table or fragment arguments: Compress data and optimize storage (SQL administration API)

Remove unsupported features

Before you revert, remove all features that your older database server does not support.

Important: Do not remove objects that you did not create, such as the boot scripts (`boot90.sql` and `boot901.sql`) in the system catalog because the reversion utility uses them.

For a list of features that you must remove before reversion, see "Review the database schema prior to reversion" on page 7-2.

Remove new BladeManager extensions

When BladeManager or SQL Registration are used to register an extension in a database, the ifxmngr Client SDK module, which manages extensions, is registered first. If you need to revert from Version 12.10, and you ran BladeManager against a database, you must remove all BladeManager extensions.

To remove the BladeManager extensions, you must use BladeManager to unregister all Client SDK modules and then run the following BladeManager command:

`unprep` *`database_name`*

Reverting from Informix Version 12.10

After preparing to revert, run the reversion utility and prepare to use the original database server.

Prerequisite: Complete the steps in "Preparing to revert" on page 7-1. Preparation includes determining if reversion is possible and preparing your database for reversion.

Review and complete all tasks that apply:

1. "Run the reversion utility" on page 7-13.
2. "Restore original configuration parameters" on page 7-14.
3. "Restore original environment variables" on page 7-14.
4. "Remove any Communications Support Module settings" on page 7-14.
5. "Recompile Java user-defined routines" on page 7-14.
6. "Reinstall and start the earlier database server" on page 7-14.
7. Optional: "Add JSON compatibility to databases that were created in 12.10.xC1" on page 7-15
8. "Optionally update statistics on your tables after reverting" on page 7-15.
9. "Verify the integrity of the reverted data" on page 7-16.
10. "Back up the database server after reversion" on page 7-16.
11. "Return the database server to online mode" on page 7-16.

12. If you use high-availability clusters, perform additional tasks that are described in "Reverting clusters" on page 5-16.

After reversion to Informix Version 10 or earlier, the database server automatically drops the **sysadmin** database.

Attention: When you revert to a previous version of the database server, do not reinitialize the database server by using the **-i** command-line parameter. Using the **-i** parameter for reversion would reinitialize the root dbspace, which would destroy your databases.

Related tasks:

"Preparing to revert" on page 7-1

Run the reversion utility

After preparing to revert, run the reversion utility by using an **onmode -b** command.

Important: You must revert to the version of Informix that was your source database before you migrated. If you revert to a different version of the server, you will corrupt data.

Informix Version 12.10 must be running when you run the reversion utility. If the reversion utility detects and lists any remaining features that are specific to Informix Version 12.10, you must remove those features before reversion can complete.

To see a list of all of the versions to which you can revert using an **onmode -b** command, type **onmode -b**.

To run the reversion utility, type

```
onmode -b verson_number
```

For examples of the **onmode -b** command, see "Syntax of the **onmode -b** command" on page 14-1.

When you revert to the older version, Informix displays messages that tell you when reversion begins and ends.

When the reversion is complete, Informix is offline. The reversion utility drops the Informix Version 12.10 system catalog tables and restores compatibility so that you can access the data with the earlier version of the database server. The reversion utility does not revert changes made to the layout of the data that do not affect compatibility.

Related concepts:

"Preparation for using the **onmode -b** command" on page 14-1

"What the **onmode -b** command does" on page 14-1

Related reference:

"Syntax of the **onmode -b** command" on page 14-1

Related information:

Conversion and reversion error messages

Restore original configuration parameters

Replace the Informix Version 12.10 ONCONFIG configuration file with the ONCONFIG file that you saved before you migrated. Alternatively, you can remove configuration parameters that the earlier database server does not support.

You might also need to adjust the values of existing configuration parameters.

For a list of new configuration parameters by server version, see Chapter 17, "Configuration parameter changes by version," on page 17-1.

Restore original environment variables

Reset the environment variables to values that are appropriate for the earlier database server.

Remove any Communications Support Module settings

If your Informix Version 12.10 instance used CSMs, edit the **sqlhosts** file to remove any **csm** option settings that are not supported in the older database server.

If you do not do this, the older database server will return an invalid **sqlhosts** options error.

You must also delete the **concsm.cfg** file if the older database server does not support CSMs.

Recompile Java user-defined routines

After you revert and before you start the earlier server, recompile Java user-defined routines (UDRs) that were compiled with a Java development kit version that is earlier than or equal to the version included with the previous server.

What you do depends on whether your application uses external JAR and class files or JAR files installed on the server:

- If your application uses external JAR and class files (for example, JAR and class files that are listed in JVPCLASSPATH), recompile the files.
- If your application uses JAR files installed in the server (for example, through the install_jar() support function), you must remove the old JAR file (by using the remove_jar() support function) and reinstall the recompiled JAR file in the database.

Reinstall and start the earlier database server

Reinstall and configure the earlier version of the database server.

Refer to the instructions in your *IBM Informix Installation Guide* and your *IBM Informix Administrator's Guide*.

Before you start the server: If you have time series data and you reverted to Informix 12.10.xC1, you must install the patch patch-idsdb00493404.tar on Informix 12.10.xC1. You can obtain the patch from the IBM Support Portal.

Run the **oninit -s** command to start the earlier database server in quiescent mode.

Important: Do **not** use the **oninit -i** command.

Add JSON compatibility to databases that were created in 12.10.xC1

Databases that were created in Informix 12.10.xC1 are not JSON compatible. In 12.10.xC2 or 12.10.xC3 you can run a script to make those databases JSON compatible. You do not have to run the script after you upgrade to 12.10.xC4 or later fixpacks because all databases are made JSON compatible during conversion.

This procedure requires Informix 12.10.xC2 or 12.10.xC3.

You must run the script as user **informix** or as a user with DBA privileges.

Run the appropriate script against a database that was created in Informix 12.10.xC1 to make the database JSON compatible.

- Informix 12.10.xC3: `convTovNoSQL1210.sql`
- Informix 12.10.xC2: `convTovNoSQL1210X2.sql`

For example, to make the **db_name** database JSON compatible in Informix 12.10.xC3, you would run the following command as user **informix** or as a user with DBA privileges:

UNIX **dbaccess -e db_name** `$INFORMIXDIR/etc/convTovNoSQL1210.sql`

Windows
dbaccess -e db_name `%INFORMIXDIR%\etc\convTovNoSQL1210.sql`

Optionally update statistics on your tables after reverting

Optionally run UPDATE STATISTICS on your tables and on UDRs that perform queries, if you have performance problems after reverting to the previous version of the database server or to a database server on a different operating system.

An unqualified UPDATE STATISTICS statement includes no additional clauses:

```
UPDATE STATISTICS;
```

By default, an unqualified UPDATE STATISTICS statement updates the statistics in LOW mode for every permanent table in the database, including the system catalog tables.

You can run an UPDATE STATISTICS statement that includes only a FOR ROUTINE clause that specifies no routine name:

```
UPDATE STATISTICS FOR ROUTINE;
```

Running this statement reoptimizes the DML statement execution plans for every SPL routine in the database that operates on local tables.

Similarly, you can substitute the keyword FUNCTION for ROUTINE in the previous example to reoptimize execution plans only for SPL routines that return at least one value, or you can substitute the keyword FUNCTION for PROCEDURE to reoptimize execution plans only for SPL routines that return no value. In these cases, the database server does not update the statistics in the system catalog tables.

You do not need to run UPDATE STATISTICS statements on C or Java UDRs.

Verify the integrity of the reverted data

Before you allow users to access the databases, check the integrity of the reverted data.

Follow the steps in "Verifying the integrity of the data" on page 3-7.

Back up the database server after reversion

After you complete the reversion, use ON-Bar or **ontape** to make a level-0 backup of the database server to which you reverted.

For more information about making backups, see your *IBM Informix Backup and Restore Guide*.

Important: Do not overwrite the tapes that you used to back up your source database server.

Return the database server to online mode

To bring the old database server online, run the **onmode -m** command.

Then users can access the data.

Register DataBlade modules

You must register any DataBlade modules that your databases require. Built-in database extensions automatically revert to the version included in the database server to which you reverted.

If you are reverting to version 11.70.xC1 or later, you do not need to register built-in database extensions because they are registered automatically.

For information on registering DataBlade modules, see the *IBM Informix DataBlade Module Installation and Registration Guide*.

Related information:

DataBlade Module Installation and Registration Guide

Part 3. Migration of data between database servers

Chapter 8. Migrating database servers to a new operating system

When you migrate to a new operating system, you must choose a tool for migrating your data, you might need to make some adjustments to your tables, and you must review environment-dependent configuration parameters and environment variables.

Related concepts:

"Paths for migration to the new version" on page 1-7

Choosing a tool for moving data before migrating between operating systems

If you are migrating between different operating systems, you must choose a method for exporting and importing data. The tool that you choose for exporting and importing data depends on how much data you plan to move.

All these methods deliver similar performance and enable you to modify the schema of the database. The tools that you can use include:

- The **dbexport** and **dbimport** utilities, which you can use to move an entire database
- The UNLOAD and LOAD statements, which move selected columns or tables (The LOAD statement does not change the data format.)
- The **dbload** utility, which you can use to change the data format
- The **onunload** utility, which unloads data in page-sized chunks, and the **onload** utility, which moves data to an identical database server on a computer of the same type
- The High-Performance Loader (HPL), which moves selected columns or tables or an entire database
- Enterprise Replication, which you can use to transfer data between Informix on one operating system and Informix on a second operating system.

For an overview of all of these data-migration tools, a comparison of tools, and information about which versions of the database server do not support all of the tools, see "Data-migration tools" on page 2-1.

Related concepts:

Chapter 9, "The dbexport and dbimport utilities," on page 9-1

Chapter 13, "The onunload and onload utilities," on page 13-1

Chapter 10, "The dbload utility," on page 10-1

Chapter 11, "The dbschema utility," on page 11-1

Chapter 12, "The LOAD and UNLOAD statements," on page 12-1

"High-Performance Loader performance advantages for large databases" on page 2-4

Related information:

Moving data with external tables

Adjusting database tables for file-system variations

File system limitations vary between NFS and non-NFS file systems. You might need to break up large tables when you migrate to a new operating system.

For example, if you have a 3 GB table, but your operating system allows only 2 GB files, break up your table into separate files before you migrate. For more information, see your *IBM Informix Administrator's Guide*.

The Informix storage space can reside on an NFS-mounted file system using regular operating-system files. For information about the NFS products you can use to NFS mount a storage space for the Informix database server, check product compatibility information.

Moving data to a database server on a different operating system

You can move data between Informix database servers on UNIX or Linux and Windows.

To move data to a database server on a different operating system:

1. Save a copy of the current configuration files.
2. Use ON-Bar or **ontape** to make a final level-0 backup. For more information, refer to your *IBM Informix Backup and Restore Guide*.
3. Choose one of the following sets of migration utilities to unload the databases:
   - **dbexport** and **dbimport**
   - UNLOAD, **dbschema**, and LOAD
   - UNLOAD, **dbschema**, and **dbload**
4. Bring the source database server offline.
5. Install and configure the target database server. If you are migrating to Windows, also install the administration tools.
6. Bring the target database server online.
7. Use **dbimport**, LOAD, or **dbload**, or external tables to load the databases into the target database server, depending on which utility you used to export the databases.
8. Make an initial level-0 backup of the target database server.
9. Run UPDATE STATISTICS to update the information that the target database server uses to plan efficient queries.

Adapting your programs for a different operating system

When you change to a different operating system, you must review and, if necessary, adjust your environment-dependent configuration parameters and environment variables.

Certain database server configuration parameters and environment variables are environment-dependent.

For details, see the information about configuration parameters in the *IBM Informix Administrator's Guide* and the *IBM Informix Administrator's Reference* and the information about environment variables in the *IBM Informix Administrator's Guide* and the *IBM Informix Guide to SQL: Reference*.

Ensuring the successful creation of system databases

The first time the database server is brought online, the **sysmaster**, **sysutils**, **sysuser**, and **sysadmin** databases are built. After moving to a database server on a different operating system, check the message log to ensure that the **sysmaster** and **sysutils** databases have been created successfully before you allow users to access the database server.

After you ensure that client users can access data on the database server, the migration process is complete.

Next you might want to seek ways to obtain maximum performance. For details on topics related to performance, see your *IBM Informix Performance Guide*.

Part 4. Data migration utilities

Chapter 9. The dbexport and dbimport utilities

The **dbexport** and **dbimport** utilities import and export a database and its schema to disk or tape.

The **dbexport** utility unloads an entire database into text files and creates a schema file. You can unload the database and its schema file either to disk or tape. If you prefer, you can unload the schema file to disk and unload the data to tape. You can use the schema file with the **dbimport** utility to re-create the database schema in another IBM Informix environment, and you can edit the schema file to modify the database that **dbimport** creates.

The **dbimport** utility creates a database and loads it with data from text files on tape or disk. The input files consist of a schema file that is used to re-create the database and data files that contain the database data. Normally, you generate the input files with the **dbexport** utility, but you can use any properly formatted input files.

Attention:

When you import a database, use the same environment variable settings and configuration parameter settings that were used when the database was created.

- If any environment variables or configuration parameters that affect fragmentation, constraints, triggers, or user-defined routines are set differently than they were when these database objects were created originally, the database that is created by the **dbimport** utility might not be an accurate reproduction of the original.
- Incompatible settings are likely to occur if you move data from an earlier version of the database server to a newer version. Over time, some configuration parameters or environment variables are deprecated, or their default values are changed. For example, assume that attached indexes were created by default in the original database. In the current version of the database server, detached indexes are created by default. If you want to maintain the original behavior, you can set the **DEFAULT_ATTACH** environment variable to 1 before you run the **dbimport** utility.

Also, the **dbimport** operation might fail when you attempt to import from a higher server version to a lower server version if the database schema changed between versions. For example, the **am_expr_pushdown** column was added to the **sysams** system catalog table in Informix 11.70. The **dbimport** operation will fail if you attempt to import a database from Informix 12.10 that contains the **am_expr_pushdown** column into a database from Informix 11.50 that is missing that column. In that case, you must review the messages in the `dbimport.out` file, which is in your current directory. After you address the issues that caused the **dbimport** operation to fail, run the **dbimport** command again.

Requirements or limitations apply in the following cases:

Compressed data

The **dbexport** utility uncompresses compressed data. You must recompress the data after you use the **dbimport** utility to import the data.

Date values

Use four-digit years for date values. The date context for an object includes the date that the object was created, the values of the **DBCENTURY** and **GL_DATE** environment variables, and some other environment variables. If the date context during import is not the same as when these objects were created, you might get explicit errors, you might not be able to find your data, or a check constraint might not work as expected. Some of these problems do not generate errors.

Tip: By default, the **dbexport** utility exports dates in four-digit years unless environment variables are set to values that would override that format.

High-availability clusters

You cannot use the **dbexport** utility on HDR secondary servers or shared disk (SD) secondary servers.

The **dbexport** utility is supported on a remote standalone (RS) secondary server only if the server is set to stop applying log files. Use the STOP_APPLY configuration parameter to stop application of log files.

The **dbimport** utility is supported on all updatable secondary servers.

Label-based access control (LBAC)

When you export data that is LBAC-protected, the data that is exported is limited to the data that your LBAC credentials allow you to read. If your LBAC credentials do not allow you to read a row, that row is not exported, but no error is returned. To export all the rows, you must be able to see all the rows.

NLSCASE mode

Whether the NLSCASE mode of your source database is SENSITIVE or INSENSITIVE, you can reduce the risk of case-sensitivity issues by always migrating to a target database that has the same NLSCASE mode as the source database. For tables that include columns with case-variant NCHAR and NVARCHAR data values (for example, 'IBM', 'ibm', 'Ibm'), you might encounter the following differences after migration:

- ORDER BY and sorting operations can produce a different ordering of qualifying rows in query results, compared to the result of the same query before migration.
- Unique indexes and referential constraints with which the data were compliant before the migration might have integrity violations in the new database, if any index or constraint key column contains case-variant forms of the same character string.
- Queries with predicates that apply conditional operators to NCHAR or NVARCHAR values might return different results from the same data after migration.

Nondefault database locales

If the database uses a nondefault locale and the **GL_DATETIME** environment variable has a nondefault setting, you must set the **USE_DTENV** environment variable to the value of 1 so that localized DATETIME values are processed correctly by the **dbexport** and **dbimport** utilities.

SELECT triggers on tables

You must disable SELECT triggers before you export a database with the **dbexport** utility. The **dbexport** utility runs SELECT statements during export. The SELECT statement triggers might modify the database content.

Virtual tables for the Informix MQ extension

The **MQCreateVtiRead()**, **MQCreateVtiReceive()**, and **MCQCreateVtiWrite()** functions create virtual tables, and map them to the appropriate IBM WebSphere® MQ message queue. When the **dbexport** utility unloads data, it removes the messages from WebSphere MQ queues. Before you use the **dbexport** utility, drop any MQ virtual tables. After you load the database with the **dbimport** utility, you can create the tables in the target database by using the appropriate functions.

Related concepts:

"Paths for migration to the new version" on page 1-7

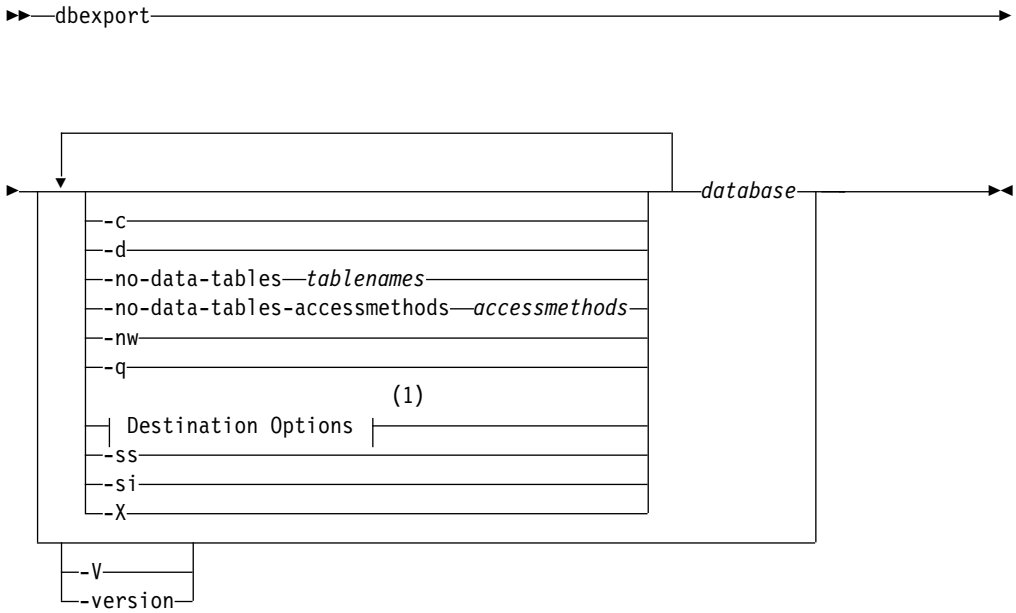
"Choosing a tool for moving data before migrating between operating systems" on page 8-1

Related reference:

"Data-migration tools" on page 2-1

Syntax of the dbexport command

The **dbexport** command unloads a database into text files that you can later import into another database. The command also creates a schema file.



Notes:

1 See "dbexport destination options" on page 9-6

Element	Purpose	Key Considerations
-c	Makes **dbexport** complete exporting unless a fatal error occurs	**References**: For details on this option, see "dbexport errors" on page 9-5.
-d	Makes **dbexport** export simple-large-object descriptors only, not simple-large-object data	

Element	Purpose	Key Considerations
-q	Suppresses the display of error messages, warnings, and generated SQL data-definition statements	None.
-ss	Generates database server-specific information for all tables in the specified database	**References**: For details on this option, see "dbexport server-specific information" on page 9-6.
-si	Excludes the generation of index storage clauses for non-fragmented tables The **-si** option is available only with the **-ss** option.	**References**: For details on this option, see "dbexport server-specific information" on page 9-6.
-X	Recognizes HEX binary data in character fields	None.
-no-data-tables	Prevents data from being exported for the specified tables. Only the definitions of the specified tables are exported.	Accepts a comma-separated list of names of tables for which data will not be exported. **Default behavior:** Only the definition of the **tsinstanceTable** table is exported, not the data. The data and definitions of all other tables are exported.
-no-data-tables-accessmethods	Prevents data from being unloaded using the specified access methods.	Accepts a comma-separated list of names of access methods. Tables using those access methods are not unloaded. **Default value:** ts_rts_vtam, ts_vtam Tables using ts_rts_vtam and ts_vtam access methods are not unloaded.
-nw	Generates the SQL for creating a database without the specification of an owner	None.
-V	Displays the software version number and the serial number	None.
-version	Extends the **-V** option to display additional information about the build operating system, build number, and build date	None.
database	Specifies the name of the database that you want to export	**Additional information**: If your locale is set to use multibyte characters, you can use multibyte characters for the database name. **References:** If you want to use more than the simple name of the database, see Database Name .

You must have DBA privileges or log in as user **informix** to export a database.

Global Language Support: When the environment variables are set correctly, as described in the *IBM Informix GLS User's Guide*, **dbexport** can handle foreign characters in data and export the data from GLS databases. For more information, refer to "Database renaming" on page 9-14.

You can set the IFX_UNLOAD_EILSEQ_MODE environment variable to enable **dbexport** to use character data that is invalid for the locale specified in the environment.

You can use delimited identifiers with the **dbexport** utility. The utility detects database objects that are keywords, mixed case, or have special characters, and the utility places double quotes around them.

In addition to the data files and the schema file, **dbexport** creates a file of messages named `dbexport.out` in the current directory. This file contains error messages, warnings, and a display of the SQL data definition statements that it generates. The same material is also written to standard output unless you specify the **-q** option.

During export, the database is locked in exclusive mode. If **dbexport** cannot obtain an exclusive lock, it displays a diagnostic message and exits.

Tip: The **dbexport** utility can create files larger than 2 GB. To support such large files, make sure your operating system file-size limits are set sufficiently high. For example, on UNIX, set **ulimit** to unlimited.

Example

The following command exports the table definitions but no data for all the tables in the customer database.

```
dbexport -no-data-tables -no-data-tables-accessmethods customer
```

Example

The following command generates the schema and data for the `customer` database without the specification of an owner:

```
dbexport customer -nw
```

Related information:

IFX_UNLOAD_EILSEQ_MODE environment variable

Termination of the dbexport utility

You can stop the **dbexport** utility at any time.

To cancel **dbexport**, press your `Interrupt` key.

The **dbexport** utility asks for confirmation before it terminates.

dbexport errors

The **dbexport -c** option tells **dbexport** to complete exporting unless a fatal error occurs.

Even if you use the **-c** option, **dbexport** interrupts processing if one of the following fatal errors occurs:

- **dbexport** is unable to open the specified tape.
- **dbexport** finds bad writes to the tape or disk.
- Invalid command parameters were used.
- **dbexport** cannot open the database or there is no system permission for doing so.
- A subdirectory with the name specified during invocation already exists

dbexport server-specific information

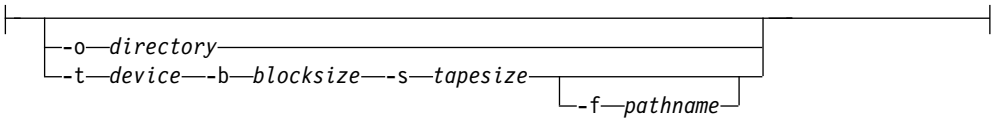
The **dbexport -ss** option generates server-specific information. This option specifies initial- and next-extent sizes, fragmentation information if the table is fragmented, the locking mode, the dbspace for a table, the blobspace for any simple large objects, and the dbspace for any smart large objects.

The **dbexport -si option**, which is available only with the **-ss** option, does not generate index storage clauses for non-fragmented tables.

dbexport destination options

The **dbexport** utility supports disk and tape destination options.

Destination options:



Element	Purpose	Key Considerations
-b *blocksize*	Specifies, in kilobytes, the block size of the tape device.	None.
-f *pathname*	Specifies the name of the path where you want the schema file stored, if you are storing the data files on tape.	The path name can be a complete path name or a file name. If only a file name is given, the file is stored in the current directory. If you do not use the -f option, the SQL source code is written to the tape.
-o *directory*	Specifies the directory on disk in which **dbexport** creates the *database*.exp directory. This directory holds the data files and the schema file that **dbexport** creates for the database.	The specified directory must exist.
-s *tapesize*	Specifies, in kilobytes, the amount of data that you can store on the tape.	To write to the end of the tape, set the value to 0. If you do not specify 0, the maximum size is 2 097 151 KB.
-t *device*	Specifies the path name of the tape device where you want the text files and, possibly, the schema file stored.	You cannot specify a remote tape device.

When you write to disk, **dbexport** creates a subdirectory, *database*.exp, in the directory that the -o option specifies. The **dbexport** utility creates a file with the .unl extension for each table in the database. The schema file is written to the file *database*.sql. The .unl and .sql files are in the *database*.exp directory.

If you do not specify a destination for the data and schema files, the subdirectory *database*.exp is placed in the current working directory.

When you write the data files to tape, you can use the -f option to store the schema file to disk. You are not required to name the schema file *database*.sql. You can give it any name.

UNIX/Linux Only

For database servers on UNIX or Linux, the command is:

```
dbexport //finland/reports
```

The following command exports the database **stores_demo** to tape with a block size of 16 KB and a tape capacity of 24 000 KB. The command also writes the schema file to /tmp/stores_demo.imp.

```
dbexport -t /dev/rmt0 -b 16 -s 24000 -f /tmp/stores_demo.imp
   stores_demo
```

The following command exports the same **stores_demo** database to the directory named /work/exports/stores_demo.exp. The resulting schema file is /work/exports/stores_demo.exp/stores_demo.sql.

```
dbexport -o /work/exports stores_demo
```

Windows Only

For Windows, the following command exports the database **stores_demo** to tape with a block size of 16 KB and a tape capacity of 24 000 KB. The schema file is written to C:\temp\stores_demo.imp.

```
dbexport -t \\.\TAPE2 -b 16 -s 24000 -f
   C:\temp\stores_demo.imp  stores_demo
```

The following command exports the same **stores_demo** database to the directory named D:\work\exports\stores_demo.exp. The resulting schema file is D:\work\exports\stores_demo.exp\stores_demo.sql.

```
dbexport -o D:\work\exports stores_demo
```

Exporting time series data in rolling window containers

The **dbexport** utility exports time series data except any data that is in the dormant window of rolling window containers.

The active window in rolling window containers is re-created after the time series data is loaded into a container.

The dormant window is not exported. To export the data from the dormant window, you must move the data into the active window.

To export time series data in the dormant window of a rolling window container:

1. If necessary, increase the size of the active window by running the **TSContainerManage** function. The size of the active window must be large enough to fit all the intervals in the dormant window can fit into the active window.
2. Move the intervals in the dormant window into the active window by running the **TSContainerManage** function.
3. Export the data by running the **dbexport** utility.

Related concepts:

"Contents of the schema file that dbexport creates"

Contents of the schema file that dbexport creates

The **dbexport** utility creates a schema file. This file contains the SQL statements that you need to re-create the exported database.

You can edit the schema file to modify the schema of the database.

If you use the **-ss** option, the schema file contains server-specific information, such as initial- and next-extent sizes, fragmentation information, lock mode, the dbspace where each table resides, the blobspace where each simple-large-object column resides, and the dbspace for smart large objects. The following information is not retained:

- Logging mode of the database

  For information about logging modes, see the *IBM Informix Guide to SQL: Reference*.
- The starting values of SERIAL columns
- The dormant window interval values for time series rolling window containers

The statements in the schema file that create tables, views, indexes, partition-fragmented tables and indexes, roles, and grant privileges do so with the name of the user who originally created the database. In this way, the original owner retains DBA privileges for the database and is the owner of all the tables, indexes, and views. In addition, the person who runs the **dbimport** command also has DBA privileges for the database.

The schema file that **dbexport** creates contains comments, which are enclosed in braces, with information about the number of rows, columns, and indexes in tables, and information about the unload files. The **dbimport** utility uses the information in these comments to load the database.

The number of rows must match in the unload file and the corresponding unload comment in the schema file. If you change the number of rows in the unload file but not the number of rows in the schema file, a mismatch occurs.

Attention: Do not delete any comments in the schema file, and do not change any existing comments or add any new comments. If you change or add comments, the **dbimport** utility might stop or produce unpredictable results.

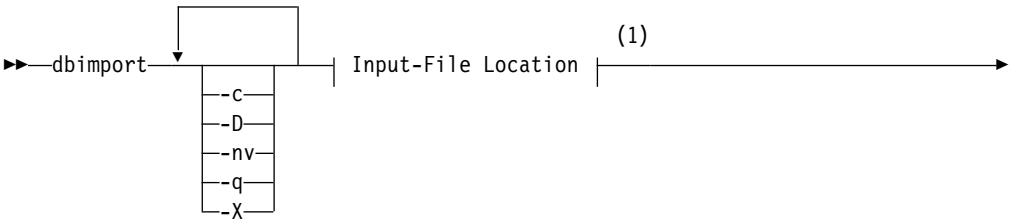
If you delete rows from an unload file, update the comment in the schema file with the correct number of rows in the unload file. Then **dbimport** is successful.

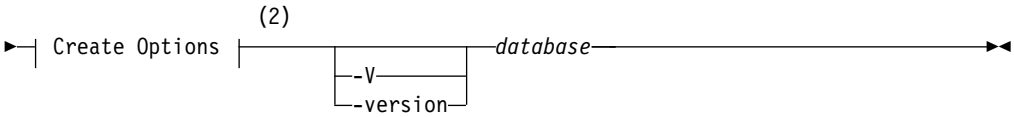
Related tasks:

"Exporting time series data in rolling window containers" on page 9-7

Syntax of the dbimport command

The **dbimport** command imports previously exported data into another database.





Notes:

1 See “dbimport input-file location options” on page 9-11

2 See “dbimport create options” on page 9-12

Element	Purpose	Key Considerations
-c	Completes importing data even when certain nonfatal errors occur	For more information, see “dbimport errors and warnings” on page 9-10.
-D	Specifies a default extent size of 16 KB for the first and subsequent extents during the import operation, if the extent sizes are not specified in the CREATE TABLE statement.	This option is ignored if the extent sizes are specified in the CREATE TABLE statement. Default values help to ensure that enough space is available in the dbspace that is designated for the import operation. This option prevents the automatic calculation of extent sizes during the import operation, and is useful especially in the following situations: • When importing tables that contain columns with large maximum row sizes, such as LVARCHAR columns. • When importing data after the **dbexport** command was run without the **-ss** option. The **-ss** option specifies server-specific information about extent sizes.
-nv	While the **dbimport -nv** command is running, tables with foreign-key constraints that ALTER TABLE ADD CONSTRAINT creates in enabled or filtering mode are not checked for violations, as if you had also specified NOVALIDATE	By bypassing the checking of referential constraints, this option can reduce migration time for very large tables that already conform to their foreign-key constraints. The NOVALIDATE mode does not persist after the ALTER TABLE ADD CONSTRAINT statement has completed.
-q	Suppresses the display of error messages, warnings, and generated SQL data-definition statements	None.
-V	Displays the software version number and the serial number	None.
-version	Extends the **-V** option to display additional information about the build operating system, build number, and build date	None.
-X	Recognizes HEX binary data in character fields	None.
database	Declares the name of the database to create	If you want to use more than the simple name of the database, see Database Name .

The **dbimport** utility can use files from the following location options:

- All input files are on disk.
- All input files are on tape.
- The schema file is on disk, and the data files are on tape.

Important: Do not put comments into your input file. Comments might cause unpredictable results when the **dbimport** utility reads them.

The **dbimport** utility supports the following tasks for an imported Informix database server:

- Specify the dbspace where the database will reside
- Create an ANSI-compliant database with unbuffered logging
- Create a database that supports explicit transactions (with buffered or unbuffered logging)
- Create an unlogged database
- Create a database with the NLS case-insensitive property for NCHAR and NVARCHAR strings.
- Process all ALTER TABLE ADD CONSTRAINT and SET CONSTRAINTS statements in the `.sql` file of the exported database that define enabled or filtering referential constraints so that any foreign-key constraints that are not specified as DISABLED are in ENABLED NOVALIDATE or in FILTERING NOVALIDATE mode.

Note: If you specify the **-nv** option, the `.sql` file of the exported database is not modified, but any foreign-key constraints that ALTER TABLE ADD CONSTRAINT or SET CONSTRAINTS statements enable are processed without checking each row of the table for violations. The `ENABLED`, or `FILTERING WITH ERROR`, or `FILTERING WITHOUT ERROR` constraint mode specifications are implemented instead as the `ENABLED NOVALIDATE`, or `FILTERING WITH ERROR NOVALIDATE` or `FILTERING WITHOUT ERROR NOVALIDATE` modes. After the foreign-key constraints have been enabled without checking for violations, their modes automatically revert to whatever the `.sql` file specified so that subsequent DML operations on the tables enforce referential integrity.

The user who runs the **dbimport** utility is granted the DBA privilege on the newly created database. The **dbimport** process locks each table as it is being loaded and unlocks the table when the loading is complete.

Global Language Support: When the GLS environment variables are set correctly, as the *IBM Informix GLS User's Guide* describes, **dbimport** can import data into database server versions that support GLS.

Termination of the dbimport utility

You can stop the **dbimport** utility at any time.

To cancel the dbimport utility, press your `Interrupt` key .

The **dbimport** utility asks for confirmation before it terminates.

dbimport errors and warnings

The **dbimport -c** option tells the **dbimport** utility to complete exporting unless a fatal error occurs.

If you include the **-c** option in a **dbimport** command, **dbimport** ignores the following errors:

- A data row that contains too many columns
- Inability to put a lock on a table
- Inability to release a lock

Even if you use the **-c** option, **dbimport** interrupts processing if one of the following fatal errors occurs:

- Unable to open the tape device specified
- Bad writes to the tape or disk
- Invalid command parameters
- Cannot open database or no system permission
- Cannot convert the data

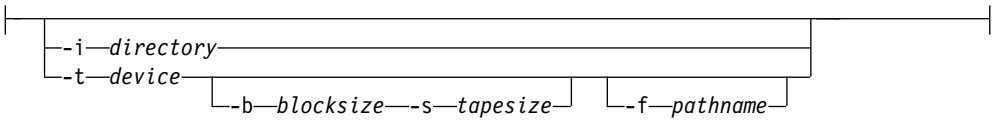
The **dbimport** utility creates a file of messages called **dbimport.out** in the current directory. This file contains any error messages and warnings that are related to **dbimport** processing. The same information is also written to the standard output unless you specify the **-q** option.

dbimport input-file location options

The input-file location specifies the location of the *database*.exp directory, which contains the files that the **dbimport** utility imports.

If you do not specify an input-file location, **dbimport** searches for data files in the directory *database*.exp under the current directory and for the schema file in *database*.exp/*database*.sql.

dbimport input-file location:



Element	Purpose	Key Considerations
-b *blocksize*	Specifies, in kilobytes, the block size of the tape device	If you are importing from tape, you must use the same block size that you used to export the database. If you do not use the -b option, the default block size is 1.
-f *pathname*	Specifies where **dbimport** can find the schema file to use as input to create the database when the data files are read from tape	If you use the -f option to export a database, you typically use the same path name that you specified in the **dbexport** command. If you specify only a file name, **dbimport** looks for the file in the .exp subdirectory of your current directory. If you do not use the -f option, the SQL source code is written to the tape.
-i *directory*	Specifies the complete path name on disk of the *database*.exp directory, which holds the input data files and schema file that **dbimport** uses to create and load the new database. The directory name must be the same as the database name.	This directory must be the same directory that you specified with the **dbexport -o** option. If you change the directory name, you also rename your database.
-s *tapesize*	Specifies, in kilobytes, the amount of data that you can store on the tape	To read to the end of the tape, specify a tape size of 0. If you are importing from tape, you must use the same tape size that you used to export the database. The maximum size is 2 097 151 KB. If you do not use the -s option, the default value is 0 (read to the end of the tape).

Element	Purpose	Key Considerations
-t *device*	Specifies the path name of the tape device that holds the input files	You cannot specify a remote tape device.

Examples showing input file location on UNIX or Linux

To import the **stores_demo** database from a tape with a block size of 16 KB and a capacity of 24 000 KB, issue this command:

```
dbimport -c  -t /dev/rmt0 -b 16 -s 24000 -f
   /tmp/stores_demo.imp stores_demo
```

The schema file is read from `/tmp/stores_demo.imp`.

To import the **stores_demo** database from the `stores_demo.exp` directory under the `/work/exports` directory, issue this command:

```
dbimport -c -i /work/exports stores_demo
```

The schema file is assumed to be `/work/exports/stores_demo.exp/stores_demo.sql`.

Examples showing input file location on Windows

To import the **stores_demo** database from a tape with a block size of 16 KB and a capacity of 24 000 KB, issue this command:

```
dbimport -c  -t \\.\TAPEDRIVE -b 16 -s 24000 -f
   C:\temp\stores_demo.imp stores_demo
```

The schema file is read from `C:\temp\stores_demo.imp`.

To import the **stores_demo** database from the `stores_demo.exp` directory under the `D:\work\exports` directory, issue this command:

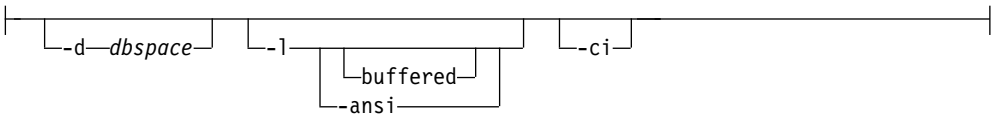
```
dbimport -c -i D:\work\exports stores_demo
```

The schema file is assumed to be `D:\work\exports\stores_demo.exp\stores_demo.sql`.

dbimport create options

The **dbimport** utility supports options for creating a database, specifying a dbspace for that database, defining logging options, and optionally specifying ANSI/ISO-compliance or NLS case-insensitivity (or both) as properties of the database.

Create options:



Element	Purpose	Key Considerations
-ansi	Creates an ANSI/ISO-compliant database in which the ANSI/ISO rules for transaction logging are enabled. Otherwise, the database uses explicit transactions by default.	If you omit the **-ansi** option, the database uses explicit transactions. **Additional Information:** For more information about ANSI/ISO-compliant databases, see the *IBM Informix Guide to SQL: Reference*.
-ci	Specifies the NLS case-insensitive property. Otherwise, the database is case-sensitive by default.	**Additional Information:** See the *IBM Informix Guide to SQL: Syntax* and *IBM Informix Guide to SQL: Reference* descriptions of the NLS case-insensitive property.
-d *dbspace*	Specifies the dbspace where the database is created. .	If this is omitted, the default location is the **root** dbspace
-l	Establishes unbuffered transaction logging for the imported database. If the **-l** flag is omitted, the database is unlogged,	**References:** For more information, see "Database-logging mode" on page 9-14.
-l buffered	Establishes buffered transaction logging for the imported database. If **-l** is included but **buffered** is omitted, the database uses unbuffered logging.	**References:** For more information, see "Database-logging mode" on page 9-14.

If you created a table or index fragment containing partitions in Informix Version 10.00 or a later version of the Informix database server, you must use syntax containing the partition name when importing a database that contains multiple partitions within a single dbspace. See the *IBM Informix Guide to SQL: Syntax* for syntax details.

Example showing dbimport create options (UNIX or Linux)

To import the **stores_demo** database from the **/usr/informix/port/stores_demo.exp** directory, issue this command:

```
dbimport -c stores_demo -i /usr/informix/port -l -ansi
```

The new database is ANSI/ISO-compliant.

The next example similarly imports the **stores_demo** database from the **/usr/informix/port/stores_demo.exp** directory. The imported database uses buffered transaction logging and explicit transactions. The **-ci** flag specifies *case insensitivity* in queries and in other operations on columns and character strings of the NCHAR and NVARCHAR data types:

```
dbimport -c stores_demo -i /usr/informix/port -l buffered -ci
```

The **-ansi** and **-ci** options for database properties are not mutually exclusive. You can specify an ANSI/ISO-compliant database that is also NLS case-insensitive, as in the following example of the **dbimport** command:

```
dbimport -c stores_demo -i /usr/informix/port -l -ansi -ci
```

Example showing dbimport create options (Windows)

To import the **stores_demo** database from the **C:\USER\informix\port\ stores_demo.exp** directory, issue this command:

```
dbimport -c stores_demo -i C:\USER\informix\port -l -ansi
```

The imported database is ANSI/ISO-compliant and is case-sensitive for all built-in character data types.

Database-logging mode

Because the logging mode is not retained in the schema file, you can specify logging information when you use the **dbimport** utility to import a database.

You can specify any of the following logging options when you use **dbimport**:

- ANSI-compliant database with unbuffered logging
- Unbuffered logging
- Buffered logging
- No logging

For more information, see "dbimport create options" on page 9-12.

The **-l** options are equivalent to the logging clauses of the CREATE DATABASE statement, as follows:

- Omitting any of the **-l** options is equivalent to omitting the WITH LOG clause.
- The **-l** option is equivalent to the WITH LOG clause.
- The **-l buffered** option is equivalent to the WITH BUFFERED LOG.
- The **-l -ansi** option is equivalent to the WITH LOG MODE ANSI clause, and implies unbuffered logging.

Related information:

CREATE DATABASE statement

Database renaming

The **dbimport** utility gives the new database the same name as the database that you exported. If you export a database to tape, you cannot change its name when you import it with **dbimport**. If you export a database to disk, you can change the database name.

You can use the RENAME DATABASE statement to change the database name.

Alternative ways to change the database name

The following examples show alternative ways to change the database name. In this example, assume that **dbexport** unloaded the database **stores_demo** into the directory **/work/exports/stores_demo.exp**. Thus, the data files (the **.unl** files) are stored in **/work/exports/stores_demo.exp**, and the schema file is **/work/exports/stores_demo.exp/stores_demo.sql**.

To change the database name to a new name on UNIX or Linux:

1. Change the name of the **.exp** directory. That is, change **/work/exports/stores_demo.exp** to **/work/exports/*newname*.exp**.
2. Change the name of the schema file. That is, change **/work/exports/stores_demo.exp/stores_demo.sql** to **/work/exports/stores_demo.exp/*newname*.sql**. Do not change the names of the **.unl** files.
3. Import the database with the following command:

   ```
   dbimport -i /work/exports newname
   ```

To change the database name to a new name on Windows:

In the following example, assume that **dbexport** unloaded the database **stores_demo** into the directory **D:\work\exports\stores_demo.exp**. Thus, the data

files (the **.unl** files) are stored in **D:\work\exports\stores_demo.exp**, and the schema file is **D:\work\exports\stores_demo.exp\stores_demo.sql**.

1. Change the name of the **.exp** directory. That is, change **D:\work\exports\stores_demo.exp** to **D:\work\exports*newname*.exp**.
2. Change the name of the schema file. That is, change **D:\work\exports\stores_demo.exp\stores_demo.sql** to **D:\work\exports\stores_demo.exp*newname*.sql**. Do not change the names of the **.unl** files.
3. Import the database with the following command:

```
dbimport -i D:\work\exports
```

Changing the database locale with dbimport

You can use the **dbimport** utility to change the locale of a database.

To change the locale of a database:

1. Set the **DB_LOCALE** environment variable to the name of the current database locale.
2. Run **dbexport** on the database.
3. Use the DROP DATABASE statement to drop the database that has the current locale name.
4. Set the **DB_LOCALE** environment variable to the desired database locale for the database.
5. Run **dbimport** to create a new database with the desired locale and import the data into this database.

Simple large objects

When the **dbimport**, **dbexport**, and DB-Access utilities process simple-large-object data, they create temporary files for that data in a temporary directory.

Before you export or import data from tables that contain simple large objects, you must have one of the following items:

- A **\tmp** directory on your currently active drive
- The **DBTEMP** environment variable set to point to a directory that is available for temporary storage of the simple large objects

Windows Only

Windows sets the **TMP** and **TEMP** environment variables in the command prompt sessions, by default. However, if the **TMP**, **TEMP**, and **DBTEMP** environment variables are not set, **dbimport** places the temporary files for the simple large objects in the **\tmp** directory.

Attention: If a table has a CLOB or BLOB in a column, you cannot use **dbexport** to export the table to a tape. If a table has a user-defined type in a column, using **dbexport** to export the table to a tape might yield unpredictable results, depending on the export function of the user-defined type. Exported CLOB sizes are stored in hex format in the unload file.

Chapter 10. The dbload utility

The **dbload** utility loads data into databases or tables that IBM Informix products created. It transfers data from one or more text files into one or more existing tables.

Prerequisites: If the database contains label-based access control (LBAC) objects, the **dbload** utility can load only those rows in which your security label dominates the column-security label or the row-security label. If the entire table is to be loaded, you must have the necessary LBAC credentials for writing all of the labeled rows and columns. For more information about LBAC objects, see the *IBM Informix Security Guide* and the *IBM Informix Guide to SQL: Syntax*.

You cannot use the **dbload** utility on secondary servers in high-availability clusters.

When you use the **dbload** utility, you can manipulate a data file that you are loading or access a database while it is loading. When possible, use the LOAD statement, which is faster than **dbload**.

The **dbload** utility gives you a great deal of flexibility, but it is not as fast as the other methods, and you must prepare a command file to control the input. You can use **dbload** with data in a variety of formats.

The **dbload** utility offers the following advantages over the LOAD statement:

- You can use **dbload** to load data from input files that were created with a variety of format arrangements. The **dbload** command file can accommodate data from entirely different database management systems.
- You can specify a starting point in the load by directing **dbload** to read but ignore *x* number of rows.
- You can specify a batch size so that after every *x* number of rows are inserted, the insert is committed.
- You can limit the number of bad rows read, beyond which **dbload** ends.

The cost of **dbload** flexibility is the time and effort spent creating the **dbload** command file, which is required for **dbload** operation. The input files are not specified as part of the **dbload** command line, and neither are the tables into which the data is inserted. This information is contained in the command file.

Related concepts:

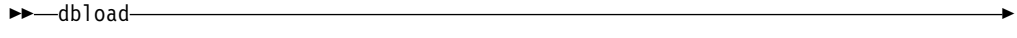
"Choosing a tool for moving data before migrating between operating systems" on page 8-1

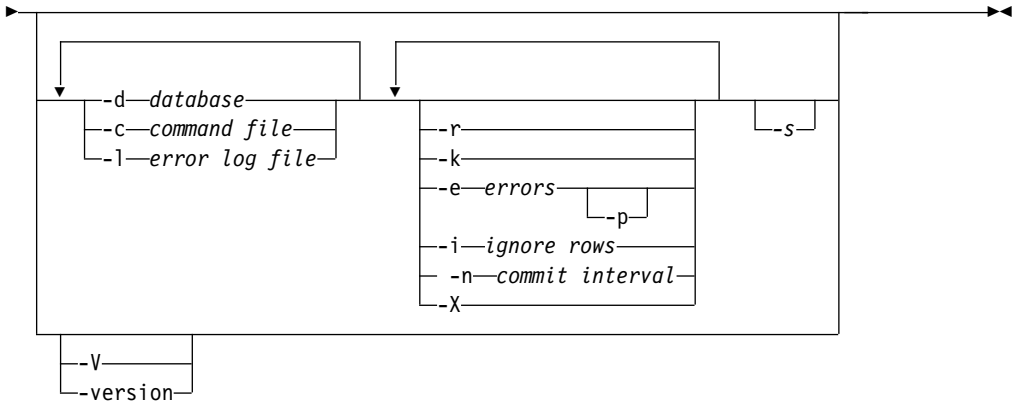
Related reference:

"Data-migration tools" on page 2-1

Syntax of the dbload command

The **dbload** command loads data into databases or tables.





Element	Purpose	Key Considerations
-c *command file*	Specifies the file name or path name of a **dbload** command file	**References:** For information about building the command file, see "Command file for the dbload utility" on page 10-5.
-d *database*	Specifies the name of the database to receive the data	**Additional Information**: To use more than the simple name of the database, see Database Name .
-e *errors*	Specifies the number of bad rows that **dbload** reads before terminating. The default value for *errors* is 10.	**References:** For more information, see "Bad-row limit during a load operation" on page 10-4.
-i *ignore rows*	Specifies the number of rows to ignore in the input file	**References:** For more information, see "Rows to ignore during a load operation" on page 10-4.
-k	Instructs **dbload** to lock the tables listed in the command file in exclusive mode during the load operation	**References:** For more information, see "Table locking during a load operation" on page 10-3. You cannot use the **-k** option with the **-r** option because the **-r** option specifies that no tables are locked during the load operation.
-l *error log file*	Specifies the file name or path name of an error log file	If you specify an existing file, its contents are overwritten. If you specify a file that does not exist, **dbload** creates the file. **Additional Information:** The error log file stores diagnostic information and any input file rows that **dbload** cannot insert into the database.
-n *commit interval*	Specifies the commit interval in number of rows The default interval is 100 rows.	**Additional Information:** If your database supports transactions, **dbload** commits a transaction after the specified number of new rows is read and inserted. A message appears after each commit. **References:** For information about transactions, see the *IBM Informix Guide to SQL: Tutorial*.
-p	Prompts for instructions if the number of bad rows exceeds the limit	**References:** For more information, see "Bad-row limit during a load operation" on page 10-4.

Element	Purpose	Key Considerations
-r	Prevents **dbload** from locking the tables during a load, thus enabling other users to update data in the table during the load	**Additional Information:** For more information, see "Table locking during a load operation." You cannot use the **-r** option with the **-k** option because the **-r** option specifies that the tables are not locked during the load operation while the **-k** option specifies that the tables are locked in exclusive mode.
-s	Checks the syntax of the statements in the command file without inserting data	**Additional Information:** The standard output displays the command file with any errors marked where they are found.
-V	Displays the software version number and the serial number	None.
-version	Extends the **-V** option to display additional information about the build operating system, build number, and build date	None.
-X	Recognizes HEX binary data in character fields	None.

Tip: If you specify part (but not all) of the required information, **dbload** prompts you for additional specifications. The database name, command file, and error log file are all required. If you are missing all three options, you receive an error message.

dbload command example

The following command loads data into the **stores_demo** database in the **turku** directory on a database server called **finland**:

```
dbload -d //finland/turku/stores_demo -c commands -l errlog
```

Table locking during a load operation

The **dbload -k** option overrides the default table lock mode during the load operation. The **-k** option instructs **dbload** to lock the tables in exclusive mode rather than shared mode.

If you do not specify the **-k** option, the tables specified in the command file are locked in shared mode. When tables are locked in shared mode, the database server still must acquire exclusive row or page locks when it inserts rows into the table.

When you specify the **-k** option, the database server places an exclusive lock on the entire table. The **-k** option increases performance for large loads because the database server does not need to acquire exclusive locks on rows or pages as it inserts rows during the load operation.

If you do not specify the **-r** option, the tables specified in the command file are locked during loading so that other users cannot update data in the table. Table locking reduces the number of locks needed during the load but reduces concurrency. If you are planning to load a large number of rows, use table locking and load during nonpeak hours.

Rows to ignore during a load operation

The **dbload -i** option specifies the number of new-line characters in the input file that **dbload** ignores before **dbload** begins to process data.

This option is useful if your most recent **dbload** session ended prematurely.

For example, if **dbload** ends after it inserts 240 lines of input, you can begin to load again at line 241 if you set *number rows ignore* to `240`.

The **-i** option is also useful if header information in the input file precedes the data records.

Bad-row limit during a load operation

The **dbload -e** option lets you specify how many bad rows to allow before **dbload** terminates.

If you set *errors* to a positive integer, **dbload** terminates when it reads (*errors* + 1) bad rows. If you set *errors* to zero, **dbload** terminates when it reads the first bad row.

If **dbload** exceeds the bad-row limit and the **-p** option is specified, **dbload** prompts you for instructions before it terminates. The prompt asks whether you want to roll back or to commit all rows that were inserted since the last transaction.

If **dbload** exceeds the bad-row limit and the **-p** option is not specified, **dbload** commits all rows that were inserted since the last transaction.

Termination of the dbload utility

If you press your `Interrupt` key, **dbload** terminates and discards any new rows that were inserted but not yet committed to the database (if the database has transactions).

Name and object guidelines for the dbload utility

You must follow guidelines for specifying network names and handling simple large objects, indexes, and delimited identifiers when you use the **dbload** utility.

Table 10-1. Name and object guidelines for the dbload utility

Objects	Guideline
Network names	If you are on a network, include the database server name and directory path with the database name to specify a database on another database server.
Simple large objects	You can load simple large objects with the **dbload** utility as long as the simple large objects are in text files.
Indexes	The presence of indexes greatly affects the speed with which the **dbload** utility loads data. For best performance, drop any indexes on the tables that receive the data before you run **dbload**. You can create new indexes after **dbload** has finished.

Table 10-1. Name and object guidelines for the dbload utility (continued)

Objects	Guideline
Delimited identifiers	You can use delimited identifiers with the **dbload** utility. The utility detects database objects that are keywords, mixed case, or have special characters, and places double quotes around them. If your most recent **dbload** session ended prematurely, specify the starting line number in the command-line syntax to resume loading with the next record in the file.

Command file for the dbload utility

Before you use the **dbload** utility, you must create a command file that names the input data files and the tables that receive the data. The command file maps fields from one or more input files into columns of one or more tables within your database.

The command file contains only FILE and INSERT statements. Each FILE statement names an input data file. The FILE statement also defines the data fields from the input file that are inserted into the table. Each INSERT statement names a table to receive the data. The INSERT statement also defines how **dbload** places the data that is described in the FILE statement into the table columns.

Within the command file, the FILE statement can appear in these forms:

- Delimiter form
- Character-position form

The FILE statement has a size limit of 4,096 bytes.

Use the delimiter form of the FILE statement when every field in the input data row uses the same delimiter and every row ends with a new-line character. This format is typical of data rows with variable-length fields. You can also use the delimiter form of the FILE statement with fixed-length fields as long as the data rows meet the delimiter and new line requirements. The delimiter form of the FILE and INSERT statements is easier to use than the character-position form.

Use the character-position form of the FILE statement when you cannot rely on delimiters and you must identify the input data fields by character position within the input row. For example, use this form to indicate that the first input data field begins at character position `1` and continues until character position `20`. You can also use this form if you must translate a character string into a null value. For example, if your input data file uses a sequence of blanks to indicate a null value, you must use this form if you want to instruct **dbload** to substitute null at every occurrence of the blank-character string.

You can use both forms of the FILE statement in a single command file. For clarity, however, the two forms are described separately in sections that follow.

Delimiter form of the FILE and INSERT statements

The FILE and INSERT statements that define information for the **dbload** utility can appear in a delimiter form.

The following example of a **dbload** command file illustrates a simple delimiter form of the FILE and INSERT statements. The example is based on the **stores_demo** database. An UNLOAD statement created the three input data files, **stock.unl**, **customer.unl**, and **manufact.unl**.

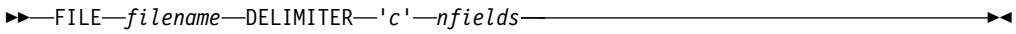
```
FILE stock.unl DELIMITER '|' 6;
INSERT INTO stock;
FILE customer.unl DELIMITER '|' 10;
INSERT INTO customer;
FILE manufact.unl DELIMITER '|' 3;
INSERT INTO manufact;
```

To see the **.unl** input data files, refer to the directory **$INFORMIXDIR/demo/*prod_name*** (UNIX or Linux) or **%INFORMIXDIR%\demo*prod_name*** (Windows).

Syntax for the delimiter form

The syntax for the delimiter form specifies the field delimiter, the input file, and the number of fields in each row of data.

The following diagram shows the syntax of the delimiter FILE statement.



Element	Purpose	Key Considerations
c	Specifies the character as the field delimiter for the specific input file	If the delimiter specified by **c** appears as a literal character anywhere in the input file, the character must be preceded with a backslash (\) in the input file. For example, if the value of **c** is specified as a square bracket ([) , you must place a backslash before any literal square bracket that appears in the input file. Similarly, you must precede any backslash that appears in the input file with an additional backslash.
filename	Specifies the input file	None.
nfields	Indicates the number of fields in each data row	None.

The **dbload** utility assigns the sequential names **f01**, **f02**, **f03**, and so on to fields in the input file. You cannot see these names, but if you refer to these fields to specify a value list in an associated INSERT statement, you must use the **f01**, **f02**, **f03** format. For details, refer to "How to write a dbload command file in delimiter form" on page 10-8.

Two consecutive delimiters define a null field. As a precaution, you can place a delimiter immediately before the new-line character that marks the end of each data row. If the last field of a data row has data, you must use a delimiter. If you omit this delimiter, an error results whenever the last field of a data row is not empty.

Inserted data types correspond to the explicit or default column list. If the data field width is different from its corresponding character column width, the data is made to fit. That is, inserted values are padded with blanks if the data is not wide enough for the column or truncated if the data is too wide for the column.

If the number of columns named is fewer than the number of columns in the table, **dbload** inserts the default value that was specified when the table was created for the unnamed columns. If no default value is specified, **dbload** attempts to insert a

null value. If the attempt violates a not null restriction or a unique constraint, the insert fails, and an error message is returned.

If the INSERT statement omits the column names, the default INSERT specification is every column in the named table. If the INSERT statement omits the VALUES clause, the default INSERT specification is every field of the previous FILE statement.

An error results if the number of column names listed (or implied by default) does not match the number of values listed (or implied by default).

The syntax of **dbload** INSERT statements resembles INSERT statements in SQL, except that in **dbload**, INSERT statements cannot incorporate SELECT statements.

Do not use the CURRENT, TODAY, and USER keywords of the INSERT INTO statement in a **dbload** command file; they are not supported in the **dbload** command file. These keywords are supported in SQL only.

For example, the following **dbload** command is not supported:

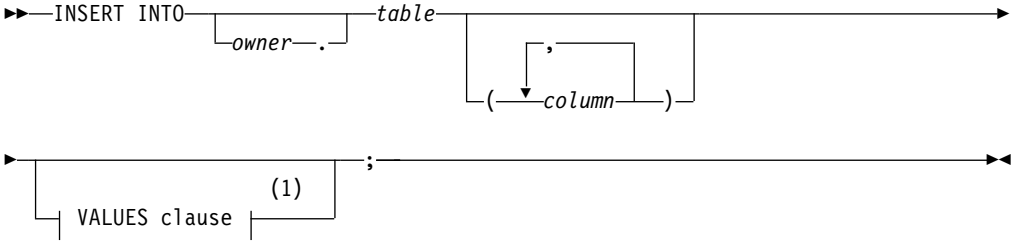
```
FILE "testtbl2.unl" DELIMITER '|' 1;
            INSERT INTO testtbl
                (testuser, testtime, testfield)
              VALUES
                ('kae', CURRENT, f01);
```

Load the existing data first and then write an SQL query to insert or update the data with the current time, date, or user login. You could write the following SQL statement:

```
INSERT INTO testtbl
               (testuser, testtime, testfield)
            VALUES
               ('kae', CURRENT, f01);
```

The CURRENT keyword returns the system date and time. The TODAY keyword returns the system date. The USER keyword returns the user login name.

The following diagram shows the syntax of the **dbload** INSERT statement for delimiter form.



Notes:

1 See VALUES Clause.

Element	Purpose	Key Considerations
column	Specifies the column that receives the new data	None.
owner.	Specifies the user name of the table owner	None.
table	Specifies the table that receives the new data	None.

Users who run **dbload** with this command file must have the Insert privilege on the named table.

How to write a dbload command file in delimiter form

Command files must contain required elements, including delimiters.

The FILE statement in the following example describes the **stock.unl** data rows as composed of six fields, each separated by a vertical bar (|) as the delimiter.

```
FILE stock.unl DELIMITER '|' 6;
INSERT INTO stock;
```

Two consecutive delimiters define a null field. As a precaution, you can place a delimiter immediately before the new-line character that marks the end of each data row. If the last field of a data row has data, you must use a delimiter. If you omit this delimiter, an error results.

Compare the FILE statement with the data rows in the following example, which appear in the input file **stock.unl**. (Because the last field is not followed by a delimiter, an error results if any data row ends with an empty field.)

```
1|SMT|baseball gloves|450.00|case|10 gloves/case
2|HRO|baseball|126.00|case|24/case
3|SHK|baseball bat|240.00|case|12/case
```

The example INSERT statement contains only the required elements. Because the column list is omitted, the INSERT statement implies that values are to be inserted into every field in the **stock** table. Because the VALUES clause is omitted, the INSERT statement implies that the input values for every field are defined in the most recent FILE statement. This INSERT statement is valid because the **stock** table contains six fields, which correspond to the number of values that the FILE statement defines.

The following example shows the first data row that is inserted into **stock** from this INSERT statement.

Field	Column	Value
f01	stock_num	1
f02	manu_code	SMT
f03	description	baseball gloves
f04	unit_price	450.00
f05	unit	case
f06	unit_descr	10 gloves/case

The FILE and INSERT statement in the following example illustrates a more complex INSERT statement syntax:

```
FILE stock.unl DELIMITER '|' 6;
INSERT INTO new_stock (col1, col2, col3, col5, col6)
   VALUES (f01, f03, f02, f05, 'autographed');
```

In this example, the VALUES clause uses the field names that **dbload** assigns automatically. You must reference the automatically assigned field names with the letter **f** followed by a number: **f01**, **f02**, **f10**, **f100**, **f999**, **f1000**, and so on. All other formats are incorrect.

Tip: The first nine fields must include a zero: f01, f02, ..., f09.

The user changed the column names, the order of the data, and the meaning of **col6** in the new **stock** table. Because the fourth column in **new_stock** (**col4**) is not named in the column list, the new data row contains a null value in the **col4** position (assuming that the column permits null values). If no default is specified for **col4**, the inserted value is null.

The following table shows the first data row that is inserted into **new_stock** from this INSERT statement.

Column	Value
col1	1
col2	baseball gloves
col3	SMT
col4	null
col5	case
col6	autographed

Character-position form of the FILE and INSERT statements

The FILE and INSERT statements that define information for the **dbload** utility can appear in a character-position form.

The examples in this topic are based on an input data file, **cust_loc_data**, which contains the last four columns (**city**, **state**, **zipcode**, and **phone**) of the **customer** table. Fields in the input file are padded with blanks to create data rows in which the location of data fields and the number of characters are the same across all rows. The definitions for these fields are CHAR(15), CHAR(2), CHAR(5), and CHAR(12), respectively. Figure 10-1 displays the character positions and five example data rows from the **cust_loc_data** file.

```
          12                  3
12345678901234567890123456789012345
   Sunnyvale      CA94086408-789-8075
   Denver         CO80219303-936-7731
   Blue Island    NY60406312-944-5691
   Brighton       MA02135617-232-4159
   Tempe          AZ85253xxx-xxx-xxxx
```

Figure 10-1. A Sample Data File

The following example of a **dbload** command file illustrates the character-position form of the FILE and INSERT statements. The example includes two new tables, **cust_address** and **cust_sort**, to receive the data. For the purpose of this example, **cust_address** contains four columns, the second of which is omitted from the column list. The **cust_sort** table contains two columns.

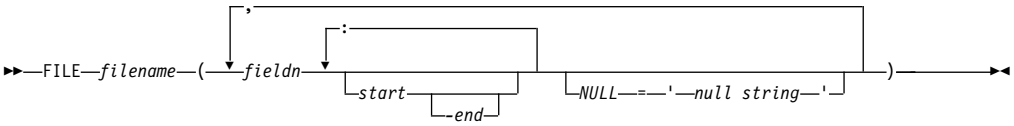
```
FILE cust_loc_data
   (city 1-15,
    state 16-17,
    area_cd 23-25 NULL = 'xxx',
    phone 23-34 NULL = 'xxx-xxx-xxxx',
    zip 18-22,
    state_area 16-17 : 23-25);
```

```
INSERT INTO cust_address (col1, col3, col4)
   VALUES (city, state, zip);
INSERT INTO cust_sort
   VALUES (area_cd, zip);
```

Syntax for the character-position form

The syntax for the character-position form specifies information that includes the character position within a data row that starts a range of character positions and the character position that ends a range of character positions.

The following diagram shows the syntax of the character-position FILE statement.



Element	Purpose	Key Considerations
-end	Indicates the character position within a data row that ends a range of character positions	A hyphen must precede the *end* value.
fieldn	Assigns a name to the data field that you are defining with the range of character positions	None.
filename	Specifies the name of the input file	None.
null string	Specifies the data value for which **dbload** must substitute a null value	Must be a quoted string.
start	Indicates the character position within a data row that starts a range of character positions. If you specify *start* without *end*, it represents a single character.	None.

You can repeat the same character position in a data-field definition or in different fields.

The *null string* scope of reference is the data field for which you define it. You can define an explicit null string for each field that allows null entries.

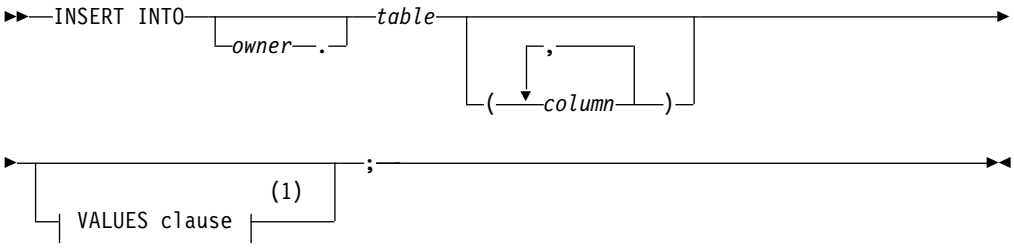
Inserted data types correspond to the explicit or default column list. If the data-field width is different from its corresponding character column, inserted values are padded with blanks if the column is wider, or inserted values are truncated if the field is wider.

If the number of columns named is fewer than the number of columns in the table, **dbload** inserts the default value that is specified for the unnamed columns. If no default value is specified, **dbload** attempts to insert a null value. If the attempt violates a not-null restriction or a unique constraint, the insert fails, and an error message is returned.

If the INSERT statement omits the column names, the default INSERT specification is every column in the named table. If the INSERT statement omits the VALUES clause, the default INSERT specification is every field of the previous FILE statement.

An error results if the number of column names listed (or implied by default) does not match the number of values listed (or implied by default).

The syntax of **dbload** INSERT statements resembles INSERT statements in SQL, except that in **dbload**, INSERT statements cannot incorporate SELECT statements. The following diagram shows the syntax of the **dbload** INSERT statement for character-position form.



Notes:

1 See VALUES Clause.

Element	Purpose	Key Considerations
column	Specifies the column that receives the new data	None.
owner.	Specifies the user name of the table owner	None.
table	Specifies the table that receives the new data	None.

The syntax for character-position form is identical to the syntax for delimiter form.

The user who runs **dbload** with this command file must have the Insert privilege on the named table.

How to write a dbload command file in character-position form

Command files must define data fields and use character positions to define the length of each field.

The FILE statement in the following example defines six data fields from the **cust_loc_data** table data rows.

```
FILE cust_loc_data
   (city 1-15,
    state 16-17,
    area_cd 23-25 NULL = 'xxx',
    phone 23-34 NULL = 'xxx-xxx-xxxx',
    zip 18-22,
    state_area 16-17 : 23-25);
INSERT INTO cust_address (col1, col3, col4)
   VALUES (city, state, zip);
```

The statement names the fields and uses character positions to define the length of each field. Compare the FILE statement in the preceding example with the data rows in the following figure.

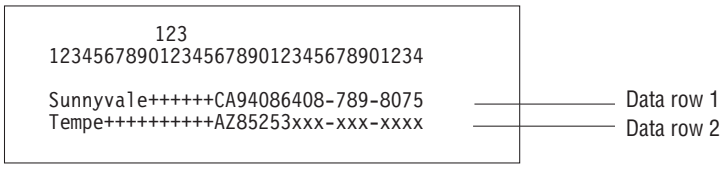


Figure 10-2. A Sample Data File

The FILE statement defines the following data fields, which are derived from the data rows in the sample data file.

Column	Values from Data Row 1	Values from Data Row 2
city	Sunnyvale++++++	Tempe++++++++++
state	CA	AZ
area_cd	408	null
phone	408-789-8075	null
zip	94086	85253
state_area	CA408	AZxxx

The null strings that are defined for the **phone** and **area_cd** fields generate the null values in those columns, but they do not affect the values that are stored in the **state_area** column.

The INSERT statement uses the field names and values that are derived from the FILE statement as the value-list input. Consider the following INSERT statement:

```
INSERT INTO cust_address (col1, col3, col4)
   VALUES (city, state, zip);
```

The INSERT statement uses the data in the sample data file and the FILE statement to put the following information into the **cust_address** table.

Column	Values from Data Row 1	Values from Data Row 2
col1	Sunnyvale++++++	Tempe++++++++++
col2	null	null
col3	CA	AZ
col4	94086	85253

Because the second column (**col2**) in **cust_address** is not named, the new data row contains a null (assuming that the column permits nulls).

Consider the following INSERT statement:

```
INSERT INTO cust_sort
   VALUES (area_cd, zip);
```

This INSERT statement inserts the following data rows into the **cust_sort** table.

Column	Values from Data Row 1	Values from Data Row 2
col1	408	null
col2	94086	85253

Because no column list is provided, **dbload** reads the names of all the columns in **cust_sort** from the system catalog. (You cannot insert data into a temporary table because temporary tables are not entered into the system catalog.) Field names from the previous FILE statement specify the values to load into each column. You do not need one FILE statement for each INSERT statement.

Command file to load complex data types

You can create **dbload** command files that load columns containing complex data types into tables.

You can use **dbload** with the following data types:

- A BLOB or CLOB
- A SET inside a ROW type

The **dbload** utility does not work with the following data types:

- A CLOB or BLOB inside a ROW type
- A ROW type inside a SET

Important: All the load utilities (**dbexport**, **dbimport**, **dbload**, **onload**, **onunload**, and **onxfer**) rely on an export and import function. If you do not define this function when you write a user-defined data type, you cannot use these utilities.

Loading a new data type inside another data type can cause problems if the representation of the data contains handles. If a string represents the data, you must be able to load it.

You can use **dbload** with named row types, unnamed row types, sets, and lists.

Using the dbload utility with named row types

The procedure for using the **dbload** utility with named row types is somewhat different than the procedure for using **dbload** with other complex data types, because named row types are actually user-defined data types.

Suppose you have a table named **person** that contains one column with a named row type. Also suppose that the **person_t** named row type contains six fields: **name**, **address**, **city**, **state**, **zip**, and **bdate**.

The following syntax shows how to create the named row type and the table used in this example:

```
CREATE ROW TYPE person_t
   (
      name VARCHAR(30) NOT NULL,
      address VARCHAR(20),
      city VARCHAR(20),
      state CHAR(2),
      zip VARCHAR(9),
      bdate DATE
   );
CREATE TABLE person of TYPE person_t;
```

To load data for a named row type (or for any user-defined data type)

1. Use the UNLOAD statement to unload the table to an input file. In this example, the input file sees the named row type as six separate fields:

   ```
   Brown, James|13 First St.|San Francisco|CA|94070|01/04/1940|
   Karen Smith|1820 Elm Ave #100|Fremont|CA|94502|01/13/1983|
   ```

2. Use the **dbschema** utility to capture the schema of the table and the row type. You must use the **dbschema -u** option to pick up the named row type.

   ```
   dbschema -d stores_demo -u person_t > schema.sql
   dbschema -d stores_demo -t person > schema.sql
   ```

3. Use DB-Access to re-create the **person** table in the new database.

For detailed steps, see "Use dbschema output as DB-Access input" on page 11-15.

4. Create the **dbload** command file. This **dbload** command file inserts two rows into the **person** table in the new database.

```
FILE person.unl DELIMITER '|' 6;
INSERT INTO person;
```

   This **dbload** example shows how to insert new data rows into the **person** table. The number of rows in the INSERT statement and the **dbload** command file must match:

```
FILE person.unl DELIMITER '|' 6;
   INSERT INTO person
   VALUES ('Jones, Richard', '95 East Ave.',
           'Philadelphia', 'PA',
   '19115',
   '03/15/97');
```

5. Run the **dbload** command:

```
dbload -d newdb -c uds_command -l errlog
```

Tip: To find the number of fields in an unloaded table that contains a named row type, count the number of fields between each vertical bar (|) delimiter.

Using the dbload utility with unnamed row types

You can use the **dbload** utility with unnamed row types, which are created with the ROW constructor and define the type of a column or field.

In the following example, the **devtest** table contains two columns with unnamed row types, **s_name** and **s_address**. The **s_name** column contains three fields: **f_name**, **m_init**, and **l_name**. The **s_address** column contains four fields: **street**, **city**, **state**, and **zip**.

```
CREATE TABLE devtest
(
s_name ROW(f_name varchar(20), m_init char(1), l_name varchar(20)
not null),
s_address ROW(street varchar(20), city varchar(20), state char(20),
zip varchar(9)
);
```

The data from the **devtest** table is unloaded into the **devtest.unl** file. Each data row contains two delimited fields, one for each unnamed row type. The ROW constructor precedes each unnamed row type, as follows:

```
ROW('Jim','K','Johnson')|ROW('10 Grove St.','Eldorado','CA','94108')|
ROW('Maria','E','Martinez')|ROW('2387 West Wilton
Ave.','Hershey','PA','17033')|
```

This **dbload** example shows how to insert data that contains unnamed row types into the **devtest** table. Put double quotes around each unnamed row type or the insert will not work.

```
FILE devtest.unl DELIMITER '|' 2;
   INSERT INTO devtest (s_name, s_address)
   VALUES ("row('Stephen', 'M', 'Wu')",
      "row('1200 Grand Ave.', 'Richmond', 'OR', '97200')");
```

Using the dbload utility with collection data types

You can use the **dbload** utility with collection data types such as SET, LIST, and MULTISET.

SET data type example

The SET data type is an unordered collection type that stores unique elements. The number of elements in a SET data type can vary, but no nulls are allowed.

The following statement creates a table in which the **children** column is defined as a SET:

```
CREATE TABLE employee
   (
      name char(30),
      address char(40),
      children SET (varchar(30) NOT NULL)
   );
```

The data from the **employee** table is unloaded into the **employee.unl** file. Each data row contains four delimited fields. The first set contains three elements (**Karen**, **Lauren**, and **Andrea**), whereas the second set contains four elements. The SET constructor precedes each SET data row.

```
Muriel|5555 SW Merry
Sailing Dr.|02/06/1926|SET{'Karen','Lauren','Andrea'}|
   Larry|1234 Indian Lane|07/31/1927|SET{'Martha',
      'Melissa','Craig','Larry'}|
```

This **dbload** example shows how to insert data that contains SET data types into the **employee** table in the new database. Put double quotes around each SET data type or the insert does not work.

```
FILE employee.unl DELIMITER '|' 4;
INSERT INTO employee
VALUES ('Marvin', '10734 Pardee', '06/17/27',
   "SET{'Joe', 'Ann'}");
```

LIST data type example

The LIST data type is a collection type that stores ordered, non-unique elements; that is, it allows duplicate element values.

The following statement creates a table in which the **month_sales** column is defined as a LIST:

```
CREATE TABLE sales_person
   (
      name CHAR(30),
      month_sales LIST(MONEY NOT NULL)
   );
```

The data from the **sales_person** table is unloaded into the **sales.unl** file. Each data row contains two delimited fields, as follows:

```
Jane Doe|LIST{'4.00','20.45','000.99'}|
Big Earner|LIST{'0000.00','00000.00','999.99'}|
```

This **dbload** example shows how to insert data that contains LIST data types into the **sales_person** table in the new database. Put double quotes around each LIST data type or the insert does not work.

```
FILE sales_person.unl DELIMITER '|' 2;
INSERT INTO sales_person
VALUES ('Jenny Chow', "{587900, 600000}");
```

You can load multisets in a similar manner.

Chapter 11. The dbschema utility

The **dbschema** utility displays the SQL statements (the *schema*) that are necessary to replicate database objects.

You can also use the **dbschema** utility for the following purposes:

- To display the distributions that the UPDATE STATISTICS statement creates.
- To display the schema for the Information Schema views
- To display the schema for creating objects such as databases, tables, sequences, synonyms, storage spaces, chunks, logs, roles, and privileges
- To display the distribution information that is stored for one or more tables in the database
- To display information about user-defined data types and row types

After you obtain the schema of a database, you can redirect the **dbschema** output to a file that you can use with DB-Access.

The **dbschema** utility is supported on all updatable secondary servers.

The **dbschema** utility is also supported on read-only secondary servers. However, the **dbschema** utility displays a warning message when running on these servers.

Attention: Use of the **dbschema** utility can increment sequence objects in the database, creating gaps in the generated numbers that might not be expected in applications that require serialized integers.

Related concepts:

"Choosing a tool for moving data before migrating between operating systems" on page 8-1

Related reference:

"Data-migration tools" on page 2-1

Object modes and violation detection in dbschema output

The output from the **dbschema** utility shows object modes and supports violation detection.

The **dbschema** output shows:

- The names of not-null constraints after the not-null specifications.

  You can use the output of the utility as input to create another database. If the same names were not used for not-null constraints in both databases, problems could result.
- The object mode of objects that are in the disabled state. These objects can be constraints, triggers, or indexes.
- The object mode of objects that are in the filtering state. These objects can be constraints or unique indexes.
- The violations and diagnostics tables that are associated with a base table (if violations and diagnostics tables were started for the base table).

For more information about object modes and violation detection, see the SET, START VIOLATIONS TABLE, and STOP VIOLATIONS TABLE statements in the *IBM Informix Guide to SQL: Syntax*.

Guidelines for using the dbschema utility

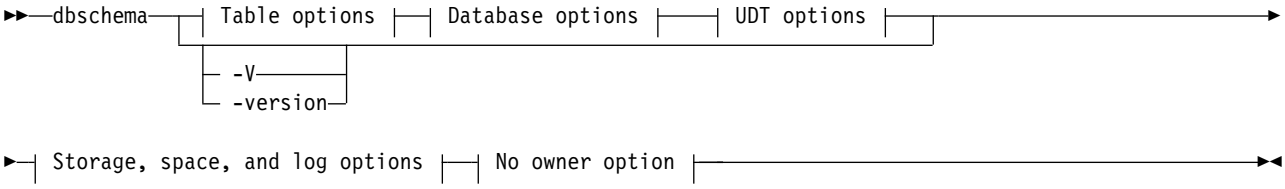
You can use delimited identifiers with the **dbschema** utility. The **dbschema** utility detects database objects that are keywords, mixed case, or that have special characters, and the utility places double quotation marks around those keywords.

Global Language Support: You must disable SELECT triggers and correctly set GLS environment variables before using the **dbschema** utility.

When the GLS environment variables are set correctly, as the *IBM Informix GLS User's Guide* describes, the **dbschema** utility can handle foreign characters.

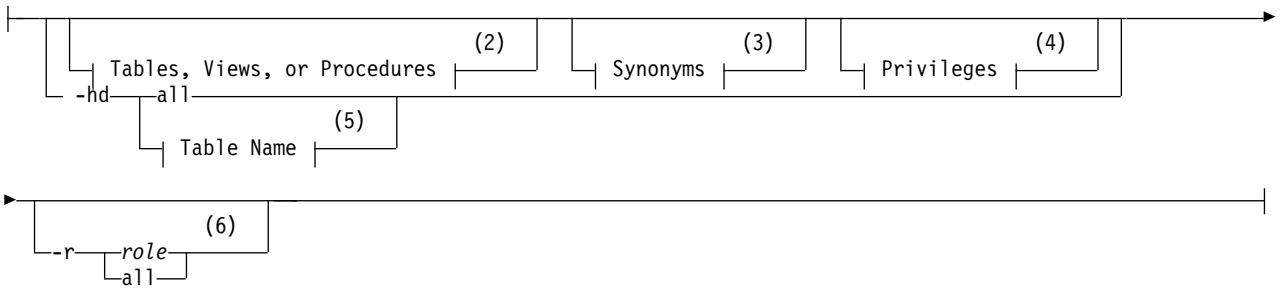
Syntax of the dbschema command

The **dbschema** command displays the SQL statements (the *schema*) that are necessary to replicate a specified database object. The command also shows the distributions that the UPDATE STATISTICS statement creates.

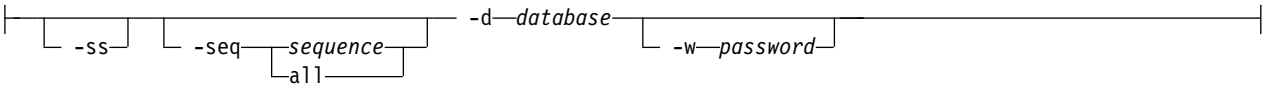


UDT options:

Table options:



Database options:



Storage space and log options:

No owner option:

Notes:

1 See "User-defined and complex data types" on page 11-6

2 See "Table, view, or procedure creation" on page 11-8

3 See "Synonym creation" on page 11-7

4 See "Privileges" on page 11-12

5 See Identifier.

6 See "Role creation" on page 11-11

7 See "Storage space, chunk, and log creation" on page 11-9

Element	Purpose	Additional Information
all	Directs **dbschema** to include all the tables or sequence objects in the database, or all the user-defined data types in the display of distributions.	None.
-c *file_name*	Generates commands to reproduce storage spaces, chunks, physical logs, and logical logs.	If you use the **-c** element without the **-ns** element, the database server generates SQL administration API commands. If you use the **-c** element and also use the **-ns** element, the database server generates **onspaces** or **onparams** commands.
-d *database*	Specifies the database to which the schema applies. The *database* can be on a remote database server.	To use more than the simple name of the database, see Database Name .
filename	Specifies the name of the file that contains the **dbschema** output.	If you omit a file name, **dbschema** sends the output to the screen. If you specify a file name, **dbschema** creates a file named *filename* to contain the **dbschema** output.
-hd	Displays the distribution as data values.	If you specify the ALL keyword for the table name, the distributions for all the tables in the database are displayed.

Element	Purpose	Additional Information
-it	Sets the isolation type for **dbschema** while **dbschema** queries catalog tables. Isolation types are: DR = Dirty Read CR = Committed Read CS = Cursor Stability CRU = Committed Read with RETAIN UPDATE LOCKS CSU = Cursor Stability with RETAIN UPDATE LOCKS DRU = Dirty Read with RETAIN UPDATE LOCKS LC = Committed Read, Last Committed RR = Repeatable Read	
-l	Sets the lock mode to wait *number of* seconds for **dbschema** while **dbschema** queries catalog tables.	None.
-ns	Generates **onspaces** or **onparams** utility commands to reproduce storage spaces, chunks, physical logs, and logical logs.	The **-c** element must precede the **-ns** element in your command.
-nw	Generates the SQL for creating an object without the specification of an owner.	The **-nw** element is also a **dbexport** command option.
-q	Suppresses the database version from the header.	This optional element precedes other elements.
-r	Generates information about the creation of roles.	For details, see "Role creation" on page 11-11.
-seq *sequence*	Generates the DDL statement to define the specified *sequence* object	None.
-ss	Generates server-specific information	This option is ignored if no table schema is generated.
-si	Excludes the generation of index storage clauses for non-fragmented tables	This option is available only with the **-ss** option.
-sl *length*	Specifies the maximum length, in bytes, of unformatted CREATE TABLE and ALTER TABLE statements.	None.
-u all	Prints the definitions of all user-defined data types, including all functions and casts defined over the types.	Specify **-u all** to include all the user-defined data types in the list of distributions.
-ua *udt_name*	Prints the definition of a user-defined data type, including functions and casts defined over an opaque or constructor type.	None.
-ui *udt_name*	Prints the definition of a user-defined data type, including type inheritance.	None.
-V	Displays the software version number and the serial number	None.
-version	Extends the **-V** option to display additional information about the build version, host, operating system, build number and date, and the GLS version.	None.

Element	Purpose	Additional Information
-w *password*	Specifies the database password, if you have one.	None.

You must be the DBA or have the Connect or Resource privilege for the database before you can run **dbschema** on it.

Example

The following command generates the schema with all the tables or sequence objects in the `customer` database, but without the specification of an owner:

```
dbschema –d customer all -nw
```

Database schema creation

You can create the schema for an entire database or for a portion of the database.

Use the **dbschema** utility options to perform the following actions:

- Display CREATE SYNONYM statements by owner, for a specific table or for the entire database.
- Display the CREATE TABLE, CREATE VIEW, CREATE FUNCTION, or CREATE PROCEDURE statement for a specific table or for the entire database.
- Display all GRANT privilege statements that affect a specified user or that affect all users for a database or a specific table. The user can be either a user name or role name.
- Display user-defined and row data types with or without type inheritance.
- Display the CREATE SEQUENCE statement defining the specified *sequence* object, or defining all sequence objects in the database.

When you use **dbschema** and specify only the database name, it is equivalent to using **dbschema** with all its options (except for the **-hd** and **-ss** options). In addition, if Information Schema views were created for the database, this schema is shown. For example, the following two commands are equivalent:

```
dbschema -d stores_demo
dbschema -s all -p all -t all -f all -d stores_demo
```

SERIAL fields included in CREATE TABLE statements that **dbschema** displays do not specify a starting value. New SERIAL fields created with the schema file have a starting value of 1, regardless of their starting value in the original database. If this value is not acceptable, you must modify the schema file.

Creating schemas for databases across a UNIX or Linux network

The **dbschema -d** option creates and displays the schema for databases on a UNIX or Linux network.

The following command displays the schema for the **stores_demo** database on the **finland** database server on the UNIX or Linux system console:

```
dbschema -d //finland/stores_demo
```

Changing the owner of an object

You can edit **dbschema** output to change the owner of a new object.

The **dbschema** utility uses the *owner.object* convention when it generates any CREATE TABLE, CREATE INDEX, CREATE SYNONYM, CREATE VIEW, CREATE

SEQUENCE, CREATE PROCEDURE, CREATE FUNCTION, or GRANT statement, and when it reproduces any unique, referential, or check constraint. As a result, if you use the **dbschema** output to create a new object (table, index, view, procedure, constraint, sequence, or synonym), the owner of the original object owns the new object. If you want to change the owner of the new object, you must edit the **dbschema** output before you run it as an SQL script.

You can use the output of **dbschema** to create a new function if you also specify the path name to a file in which compile-time warnings are stored. This path name is displayed in the **dbschema** output.

For more information about the CREATE TABLE, CREATE INDEX, CREATE SYNONYM, CREATE VIEW, CREATE SEQUENCE, CREATE PROCEDURE, CREATE FUNCTION, and GRANT statements, see the *IBM Informix Guide to SQL: Syntax*.

dbschema server-specific information

The **dbschema -ss** option generates server-specific information. The **-ss** option always generates the lock mode, extent sizes, and the dbspace name if the dbspace name is different from the database dbspace. In addition, if tables are fragmented, the **-ss** option displays information about the fragmentation strategy.

When you specify the **dbschema -ss** option, the output also displays any GRANT FRAGMENT statements that are issued for a particular user or in the entire schema.

The **-si option**, which is available only with the **-ss** option, excludes the generation of index storage clauses for non-fragmented tables.

If the dbspace contains multiple partitions, dbspace partition names appear in the output.

For information about fragment-level authority, see the GRANT FRAGMENT and REVOKE FRAGMENT statements in the *IBM Informix Guide to SQL: Syntax*.

User-defined and complex data types

The **dbschema -u** option displays the definitions of any user-defined and complex data types that the database contains. The suboption **i** adds the type inheritance to the information that the **dbschema -u** option displays.

The following command displays all the user-defined and complex data types for the **stork** database:

```
dbschema -d stork -u all
```

Output from **dbschema** that ran with the specified option `-u all` might appear as the following example shows:

```
create row type 'informix'.person_t
   (
   name varchar(30, 10) not null,
   address varchar(20, 10),
   city varchar(20, 10),
   state char(2),
   zip integer,
   bdate date
   );
create row type 'informix'.employee_t
```

```
   (
   salary integer,
   manager varchar(30, 10)
   ) under person_t;
```

The following command displays the user-defined and complex data types, as well as their type inheritance for the **person_t** table in the **stork** database:

```
dbschema -d stork -ui person_t
```

Output from **dbschema** that ran with the option `-ui person_t` might appear as the following example shows:

```
create row type 'informix'.person_t
   (
   name varchar(30, 10) not null,
   address varchar(20, 10),
   city varchar(20, 10),
   state char(2),
   zip integer,
   bdate date
   );
create row type 'informix'.employee_t
   (
   salary integer,
   manager varchar(30, 10)
   ) under person_t;
create row type 'informix'.sales_rep_t
   (
   rep_num integer,
   region_num integer,
   commission decimal(16),
   home_office boolean
   ) under employee_t;
```

Sequence creation

The **dbschema -seq** *sequence* command generates information about sequence creation.

The following syntax diagram fragment shows sequence creation.

Element	Purpose	Key Considerations
-seq ***sequence***	Displays the CREATE SEQUENCE statement defining ***sequence***	None.
-seq all	Displays all CREATE SEQUENCE statements for the database	None.

Running **dbschema** with option **-seq** sequitur might produce this output:

```
CREATE SEQUENCE sequitur INCREMENT 10 START 100 NOCACHE CYCLE
```

For more information about the CREATE SEQUENCE statement, see the *IBM Informix Guide to SQL: Syntax*.

Synonym creation

The **dbschema -s** command generates information about synonym creation.

The following syntax diagram fragment shows the creation of synonyms.

Synonyms:

Element	Purpose	Key Considerations
-s *ownername*	Displays the CREATE SYNONYM statements owned by *ownername*	None.
-s all	Displays all CREATE SYNONYM statements for the database, table, or view specified	None.

Output from **dbschema** that ran with the specified option `-s alice` might appear as the following example shows:

```
CREATE SYNONYM 'alice'.cust FOR 'alice'.customer
```

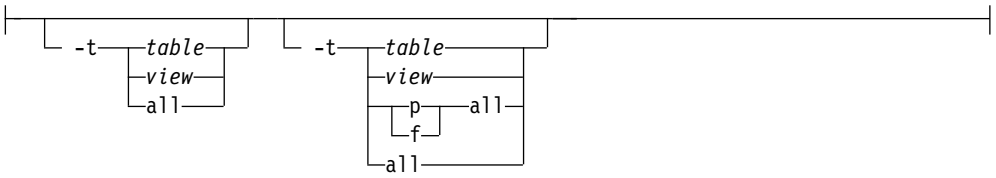
For more information about the CREATE SYNONYM statement, see the *IBM Informix Guide to SQL: Syntax*.

Table, view, or procedure creation

Several **dbschema** options generate information that shows the creation of tables, views, and procedures.

The following syntax diagram shows the creation of tables, views, and procedures.

Tables, Views, or Procedures::



Element	Purpose	Key Considerations
-f all	Limits the SQL statement output to those statements that replicate all functions and procedures	None.
-f *function*	Limits the SQL statement output to only those statements that replicate the specified function	None.
-f *procedure*	Limits the SQL statement output to only those statements that replicate the specified procedure	None.
-ff all	Limits the SQL statement output to those statements that replicate all functions	None.
-fp all	Limits the SQL statement output to those statements that replicate all procedures	None.
-t *table*	Limits the SQL statement output to only those statements that replicate the specified table	None.
-t *view*	Limits the SQL statement output to only those statements that replicate the specified view	None.
-t all	Includes in the SQL statement output all statements that replicate all tables and views	None.

For more information about the CREATE PROCEDURE and CREATE FUNCTION statements, see the *IBM Informix Guide to SQL: Syntax*.

Table information

The **dbschema -ss** command retrieves information about fragmented tables, the lock mode, and extent sizes.

The following **dbschema** output shows the expressions specified for fragmented table.

```
{ TABLE "sallyc".t1 row size = 8 number of columns = 1 index size = 0 }
create table "sallyc".t1
(
c1 integer
) fragment by expression
(c1 < 100 ) in db1 ,
((c1 >= 100 ) AND (c1 < 200 ) ) in db2 ,
remainder in db4
extent size 16 next size 16 lock mode page;
revoke all on "sallyc".t1 from "public";
```

The following **dbschema** output shows information about partitions in partition-fragmented tables.

```
DBSCHEMA Schema Utility                       grant dba to "sqlqa";
{ TABLE "sqlqa".t1 row size = 24 number of columns = 2 index size = 13 }
create table "sqlqa".t1
(
c1 integer,
c2 char(20)
)
fragment by expression
partition part_1 (c1 = 10 ) in dbs1 ,
partition part_2 (c1 = 20 ) in dbs1 ,
partition part_3 (c1 = 30 ) in dbs1 ,
partition part_4 (c1 = 40 ) in dbs1 ,
partition part_5 (c1 = 50 ) in dbs1
extent size 16  next size 16 lock mode page;
```

Storage space, chunk, and log creation

The **dbschema -c** command generates SQL administration API commands for reproducing storage spaces, chunks, logical logs, and physical logs. If you use the **dbschema -c -ns** command, the database server generates **onspaces** or **onparams** utility commands for reproducing storage spaces, chunks, physical logs, and logical logs.

For example:

- Run the following command to generate a file named `dbschema1.out` that contains the commands for reproducing the storage spaces, chunks, physical logs, and logical logs in SQL Admin API format:

  ```
  dbschema -c dbschema1.out
  ```

- Run the following command to generate a file named `dbschema2.out` that contains the commands for reproducing the storage spaces, chunks, physical logs, and logical logs in **onspaces** and **onparams** utility format:

  ```
  dbschema -c -ns dbschema2.out
  ```

Optionally, specify **-q** before you specify `-c` or `-c -ns` to suppress the database version when you run the command. For example, specify:

```
dbschema -q -c -ns dbschema3.out
```

Sample output for the creation of storage spaces, chunks, and logs

The output of the **dbschema -c** or **dbschema -c -ns** commands contain all of the SQL administration API or **onspaces** and **onparams** utility commands that you can use to reproduce storage spaces, chunks, and logs.

Example of output in SQL administration API format

```
# Dbspace 1 -- Chunk 1
EXECUTE FUNCTION TASK ('create dbspace', 'rootdbs',
 '/export/home/informix/data/rootdbs1150fc4', '200000',
 '0', '2', '500', '100')

# Dbspace 2 -- Chunk 2
EXECUTE FUNCTION TASK ('create dbspace', 'datadbs1',
 '/export/home/informix/data/datadbs1150fc4', '5000000',
 '0', '2', '100', '100')

# Dbspace 3 -- Chunk 3
EXECUTE FUNCTION TASK ('create dbspace', 'datadbs2',
 '/export/home/informix/data/datadbs2150fc4', '5000000',
 '0', '2', '100', '100')

# Dbspace 4 -- Chunk 4
EXECUTE FUNCTION TASK ('create dbspace', 'datadbs3',
 '/export/home/informix/data/datadbs3_1150fc4', '80000',
 '16', '8', '400', '400')
EXECUTE FUNCTION TASK ('start mirror', 'datadbs3',
 '/export/home/informix/data/datadbs3_1150fc4', '80000',
 '16', '/export/home/informix/data/mdatadbs3_1150fc4', '16')

# Dbspace 5 -- Chunk 5
EXECUTE FUNCTION TASK ('create tempdbspace', 'tempdbs',
 '/export/home/informix/data/tempdbs_1150fc4', '1000',
 '0', '2', '100', '100')

# Dbspace 6 -- Chunk 6
EXECUTE FUNCTION TASK ('create sbspace', 'sbspace',
 '/export/home/informix/data/sbspace_1150fc4',
 '1000', '0')

# Dbspace 6 -- Chunk 7
EXECUTE FUNCTION TASK ('add chunk', 'sbspace',
 '/export/home/informix/data/sbspace_1_1150fc4',
 '1000', '0')

# Dbspace 7 -- Chunk 8
EXECUTE FUNCTION TASK ('create blobspace', 'blobdbs',
 '/export/home/informix/data/blobdbs_1150fc4',
 '1000', '0', '4')

# External Space 1
EXECUTE FUNCTION TASK ('create extspace', 'extspace',
'/export/home/informix/data/extspac_1150fc4')

# Physical Log
EXECUTE FUNCTION TASK ('alter plog', 'rootdbs', '60000')

# Logical Log 1
EXECUTE FUNCTION TASK ('add log', 'rootdbs', '10000')
```

Example of output in onspaces and onparams utility format

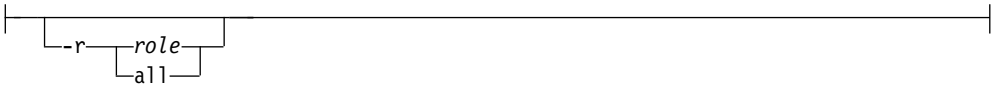
```
# Dbspace 1 -- Chunk 1
onspaces -c -d rootdbs -k 2 -p
 /export/home/informix/data/rootdbs1150fc4
 -o 0 -s 200000 -en 500 -ef 100

# Dbspace 2 -- Chunk 2
onspaces -c -d datadbs1 -k 2 -p
 /export/home/informix/data/datadbs1150fc4
 -o 0 -s 5000000 -en 100 -ef 100

# Dbspace 3 -- Chunk 3
onspaces -c -d datadbs2 -k 2 -p
 /export/home/informix/data/datadbs2150fc4
 -o 0 -s 5000000 -en 100 -ef 100

 Dbspace 4 -- Chunk 4
onspaces -c -d datadbs3 -k 8
 -p /export/home/informix/data/datadbs3_1150fc4
 -o 16 -s 80000 -en 400 -ef 400
 -m /export/home/informix/data/mdatadbs3_1150fc4 16

# Dbspace 5 -- Chunk 5
onspaces -c -d tempdbs -k 2 -t -p
 /export/home/informix/data/tempdbs_1150fc4 -o 0 -s 1000

# Dbspace 6 -- Chunk 6
onspaces -c -S sbspace -p
 /export/home/informix/data/sbspace_1150fc4
 -o 0 -s 1000 -Ms 500

# Dbspace 7 -- Chunk 7
onspaces -c -b blobdbs -g 4 -p
 /export/home/informix/data/blobdbs_1150fc4 -o 0 -s 1000

# External Space 1
onspaces -c -x extspace -l
 /export/home/informix/data/extspac_1150fc4

# Logical Log 1
onparams -a -d rootdbs -s 10000
```

Role creation

The **dbschema -r** command generates information on the creation of roles.

The following syntax diagram shows the creation of roles.

Roles:



Element	Purpose	Key Considerations
-r *role*	Displays the CREATE ROLE and GRANT statements that are needed to replicate and grant the specified role.	You cannot specify a list of users or roles with the **-r** option. You can specify either one role or all roles.
-r all	Displays all CREATE ROLE and GRANT statements that are needed to replicate and grant all roles.	None

The following **dbschema** command and output show that the role **calen** was created and was granted to **cathl**, **judith,** and **sallyc**:

```
sharky% dbschema -r calen -d stores_demo

DBSCHEMA Schema Utility
Software Serial Number RDS#N000000
create role calen;

grant calen to cathl with grant option;
grant calen to judith ;
grant calen to sallyc ;
```

Related information:

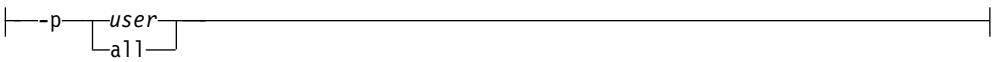
User roles

Privileges

The **dbschema -p** command generates information on privileges.

The following syntax diagram fragment shows privileges information.

Privileges:



Element	Purpose	Key Considerations
-p *user*	Displays the GRANT statements that grant privileges to *user*, where *user* is a user name or role name. Specify only one user or role	You cannot specify a specific list of users with the **-p** option. You can specify either one user or role, or all users and roles.
-p all	Displays the GRANT statements for all users for the database, table, or view specified, or to all roles for the table specified	None.

The output also displays any GRANT FRAGMENT statements that are issued for a specified user or role or (with the **all** option) for the entire schema.

Granting privileges

You can generate **dbschema** information about the grantor of a GRANT statement.

In the **dbschema** output, the AS keyword indicates the grantor of a GRANT statement. The following example output indicates that **norma** issued the GRANT statement:

```
GRANT ALL ON 'tom'.customer TO 'claire' AS 'norma'
```

When the GRANT and AS keywords appear in the **dbschema** output, you might need to grant privileges before you run the **dbschema** output as an SQL script. Referring to the previous example output line, the following conditions must be true before you can run the statement as part of a script:

- User **norma** must have the Connect privilege to the database.
- User **norma** must have all privileges WITH GRANT OPTION for the table **tom.customer**.

For more information about the GRANT, GRANT FRAGMENT, and REVOKE FRAGMENT statements, see the *IBM Informix Guide to SQL: Syntax*.

Displaying privilege information for a role

You can generate **dbschema** information about the privileges that were granted for a particular role.

A *role* is a classification with privileges on database objects granted to the role. The DBA can assign the privileges of a related work task, such as an engineer, to a role and then grant that role to users, instead of granting the same set of privileges to every user. After a role is created, the DBA can use the GRANT statement to grant the role to users or to other roles.

For example, issue the following **dbschema** command and to display privileges that were granted for the **calen** role.

```
sharky% dbschema -p calen -d stores_demo
```

An example of information the **dbschema** utility displays is:

```
grant alter on table1 to 'calen'
```

Distribution information for tables in dbschema output

The **dbschema -hd** command with the name of the table retrieves the distribution information that is stored for a table in a database. If you specify the ALL keyword for the table name, the distributions for all the tables in the database are displayed.

During the **dbimport** operation, distribution information is created automatically for leading indexes on non-opaque columns. Run the UPDATE STATISTICS statement in MEDIUM or HIGH mode to create distribution information about tables that have the following types of indexes:

- Virtual Index Interface (VII) or function indexes
- Indexes on columns of user-defined data types
- Indexes on columns of built-in opaque data types (such as BOOLEAN or LVARCHAR)

Output from the **dbschema** utility shows distribution information if you used the SAMPLING SIZE keywords when UPDATE STATISTICS in MEDIUM or HIGH mode ran on the table.

For information about using the UPDATE STATISTICS statement, see the *IBM Informix Guide to SQL: Syntax*.

The output of **dbschema** for distributions is provided in the following parts:

- Distribution description
- Distribution information
- Overflow information

Each section of **dbschema** output is explained in the following sections. As an example, the discussion uses the following distribution for the fictional table called **invoices**. This table contains 165 rows, including duplicates.

You can generate the output for this discussion with a call to **dbschema** that is similar to the following example:

```
dbschema -hd invoices -d pubs_stores_demo
```

Example of dbschema output showing distribution information

The **dbschema** output can show the data distributions that have been created for the specified table and the date when the UPDATE STATISTICS statement that generated the distributions ran.

The follow example of **dbschema** output shows distribution information.

```
Distribution for cathl.invoices.invoice_num

High Mode, 10.000000 Resolution

--- DISTRIBUTION ---

     (                        5)
  1: (  16,     7,           11)
  2: (  16,     6,           17)
  3: (  16,     8,           25)
  4: (  16,     8,           38)
  5: (  16,     7,           52)
  6: (  16,     8,           73)
  7: (  16,    12,           95)
  8: (  16,    12,          139)
  9: (  16,    11,          182)
 10: (  10,     5,          200)

--- OVERFLOW ---

  1: (   5,                 56)
  2: (   6,                 63)
}
```

Description of the distribution information in the example

The first part of the sample **dbschema** output describes which data distributions have been created for the specified table. The name of the table is stated in the following example:

```
Distribution for cathl.invoices.invoice_num
```

The output is for the **invoices** table, which is owned by user `cathl`. This data distribution describes the column **invoice_num**. If a table has distributions that are built on more than one column, **dbschema** lists the distributions for each column separately.

The **dbschema** output also shows the date when the UPDATE STATISTICS statement that generated the distributions ran. You can use this date to tell how outdated your distributions are.

The last line of the description portion of the output describes the mode (MEDIUM or HIGH) in which the distributions were created, and the resolution. If you create the distributions with medium mode, the confidence of the sample is also listed. For example, if the UPDATE STATISTICS statement runs in HIGH mode with a resolution of `10`, the last line appears as the following example shows:

```
High Mode, 10.000000 Resolution
```

Distribution information in dbschema output

The distribution information in **dbschema** output describes the bins that are created for the distribution, the range of values in the table and in each bin, and the number of distinct values in each bin.

Consider the following example:

```
    (                      5)
 1: (  16,     7,          11)
 2: (  16,     6,          17)
 3: (  16,     8,          25)
 4: (  16,     8,          38)
 5: (  16,     7,          52)
 6: (  16,     8,          73)
 7: (  16,    12,          95)
 8: (  16,    12,         139)
 9: (  16,    11,         182)
10: (  10,     5,         200)
```

The first value in the rightmost column is the smallest value in this column. In this example, it is 5.

The column on the left shows the bin number, in this case 1 through 10. The first number in parentheses shows how many values are in the bin. For this table, 10 percent of the total number of rows (165) is rounded down to 16. The first number is the same for all the bins except for the last. The last row might have a smaller value, indicating that it does not have as many row values. In this example, all the bins contain 16 rows except the last one, which contains 10.

The middle column within the parentheses indicates how many distinct values are contained in this bin. Thus, if there are 11 distinct values for a 16-value bin, it implies that one or more of those values are duplicated at least once.

The right column within the parentheses is the highest value in the bin. The highest value in the last bin is also the highest value in the table. For this example, the highest value in the last bin is 200.

Overflow information in dbschema output

The last portion of the **dbschema** output shows values that have many duplicates.

The number of duplicates of indicated values must be greater than a critical amount that is determined as approximately 25 percent of the resolution times the number of rows. If left in the general distribution data, the duplicates would skew the distribution, so they are moved from the distribution to a separate list, as the following example shows:

```
--- OVERFLOW ---

  1: (   5,           56)
  2: (   6,           63)
```

For this example, the critical amount is `0.25 * 0.10 * 165`, or `4.125`. Therefore, any value that is duplicated five or more times is listed in the overflow section. Two values in this distribution are duplicated five or more times in the table: the value 56 is duplicated five times, and the value 63 is duplicated six times.

Use dbschema output as DB-Access input

You can use the **dbschema** utility to get the schema of a database and redirect the **dbschema** output to a file. Later, you can import the file into DB-Access and use DB-Access to re-create the schema in a new database.

Inserting a table into a dbschema output file

You can insert CREATE TABLE statements into the **dbschema** output file and use this output as DB-Access input.

The following example copies the CREATE TABLE statements for the customer table into the **dbschema** output file, **tab.sql**:

```
dbschema -d db -t customer > tab.sql
```

Remove the header information about **dbschema** from the output file, **tab.sql**, and then use DB-Access to re-create the table in another database, as follows:

```
dbaccess db1 tab.sql
```

Re-creating the schema of a database

You can use **dbschema** and DB-Access to save the schema from a database and then re-create the schema in another database. A **dbschema** output file can contain the statements for creating an entire database.

To save a database schema and re-create the database:

1. Use **dbschema** to save the schema to an output file, such as **db.sql**:

   ```
   dbschema -d db > db.sql
   ```

   You can also use the **-ss** option to generate server-specific information:

   ```
   dbschema -d db -ss > db.sql
   ```

2. Remove the header information about **dbschema**, if any, from the output file.
3. Add a CREATE DATABASE statement at the beginning of the output file or use DB-Access to create a new database.
4. Use DB-Access to re-create the schema in a new database:

   ```
   dbaccess - db.sql
   ```

   When you use **db.sql** to create a database on a different database server, confirm that dbspaces exist.

The databases **db** and **testdb** differ in name but have the same schema.

Chapter 12. The LOAD and UNLOAD statements

You can use the SQL LOAD and UNLOAD statements to move data. The LOAD statement is moderately fast and easy to use, but it only accepts specified data formats. You usually use the LOAD statement with data that is prepared with an UNLOAD statement.

You can use the UNLOAD statement in DB-Access to unload selected rows from a table into a text file.

The UNLOAD statement lets you manipulate the data as you unload it, but it requires that you unload to files on disk instead of to tape. If you unload to disk files, you might need to use UNIX, Linux, or Windows utilities to load those files onto tape.

To load tables, use LOAD or **dbload**. To manipulate a data file that you are loading or to access a database while it is loading, use the **dbload** utility. The cost of the flexibility is the time you spend creating the **dbload** command file and slower execution. When possible, use the LOAD statement, which is faster than **dbload**.

If the database contains label-based access control (LBAC) objects, you can load or unload only those rows in which your security label dominates the column-security label or the row-security label. If entire table is to be loaded or unloaded, you must have the necessary LBAC credentials for writing/reading all of the labeled rows and columns. For more information about LBAC objects, see the *IBM Informix Security Guide* and the *IBM Informix Guide to SQL: Syntax*.

Related concepts:

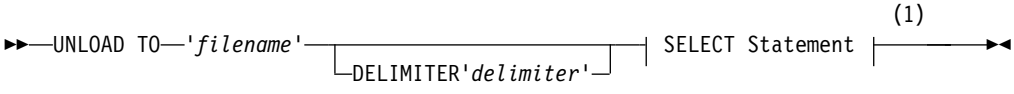
"Choosing a tool for moving data before migrating between operating systems" on page 8-1

Related reference:

"Data-migration tools" on page 2-1

Syntax of the UNLOAD statement

The UNLOAD statement in DB-Access unloads selected rows from a text file.



Notes:

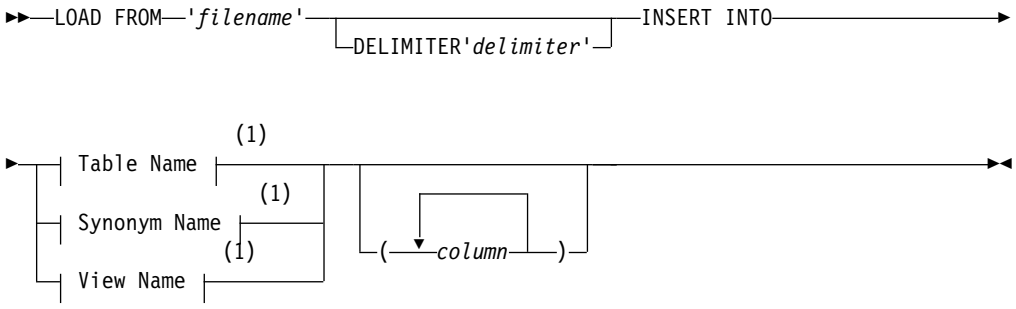
1 See SELECT statement.

Element	Purpose	Key Considerations
delimiter	Character to use as delimiter	**Requirements**: See "Syntax for the delimiter form" on page 10-6
filename	Specifies the input file	None.

This syntax diagram is only for quick reference. For details about the syntax and use of the UNLOAD statement, see UNLOAD statement.

Syntax of the LOAD statement

The LOAD statement in DB-Access appends rows to an existing table of a database.



Notes:

1 See Identifier.

Element	Purpose	Key Considerations
column	The name of a column to receive data from *filename*	Must be a column in the specified table or view.
delimiter	Character to use as delimiter	See "Syntax for the delimiter form" on page 10-6
filename	Specifies the input file	None.

This syntax diagram is only for quick reference. For details about the syntax and use of the LOAD statement, see LOAD statement.

Load and unload statements for locales that support multibyte code sets

For locales that support multibyte code sets, be sure that the declared size (in bytes) of any column that receives character data is large enough to store the entire data string.

For some locales, this can require up to 4 times the number of logical characters in the longest data string.

Load and unload operations for nondefault locales and GL_DATETIME or DBTIME environment variables

In nondefault locales, operations that load or unload DATETIME or INTERVAL values can be sensitive to the settings of the **GL_DATETIME**, **DBTIME**, and **USE_DTENV** environment variables.

If the database uses a nondefault locale and the **GL_DATETIME** or **DBTIME** environment variable has a nondefault setting, you must set the **USE_DTENV** environment variable to the value of 1 before you can process localized DATETIME or INTERVAL values correctly

- with the LOAD or UNLOAD statements of **DB-Access**,

- or with the **dbimport** or **dbexport** utilities,
- or in DML operations on objects that the CREATE EXTERNAL TABLE statement defined.

Chapter 13. The onunload and onload utilities

The **onunload** and **onload** utilities provide the fastest way to move data between computers that use the same database server on the same platform.

For example, your site purchases a more powerful UNIX computer to allow faster access for users. You need to transfer existing databases to the new database server on the new computer. Use **onunload** to unload data from the first database server and then use **onload** to load the data into the second database server. Both database servers must have the same version number, or they must have compatible version numbers. You can move an entire database or selected tables only, but you cannot modify the database schema.

The **onunload** utility can unload data more quickly than either **dbexport** or the UNLOAD statement because **onunload** copies the data in binary format and in page-sized units. The **onload** utility takes a tape or a file that the **onunload** utility creates and re-creates the database or the table.

The **onunload** and **onload** utilities are faster than **dbimport**, **dbload**, or LOAD but are much less flexible and do not let you modify the database schema or move from one operating system or database server version to another.

Related concepts:

"Choosing a tool for moving data before migrating between operating systems" on page 8-1

Related reference:

"Data-migration tools" on page 2-1

Guidelines for when to use the onunload and onload utilities

You can use **onunload** and **onload** only when certain conditions are met.

You can use only **onunload** and **onload** if your answer to each of the following questions is *yes*. If your answer is *no*, you cannot use **onunload** and **onload**.

Use onunload and onload only if your answer to each question is yes	My answer
Is the target database server on the same hardware platform?	
Do you want to move to another database server of the same version?	
Do you want to keep the existing database schema without modifying it?	
Do you want to move an entire database or an entire table?	
Are the page images compatible?	
Are the numeric representations the same?	

When you cannot use the onunload and onload utilities

Because the data is written in page-sized units, you cannot use **onunload** and **onload** to move data between UNIX or Linux and Windows because they use different page sizes. For example, the page size is 2 KB on some UNIX systems and 4 KB on Windows.

Additionally, you cannot use **onunload** and **onload**:

- To move data between GLS and non-GLS databases.
- To move compressed data from one database to another.

  You must uncompress data in compressed tables and fragments before you use the **onload** and **onunload** utilities.
- To move external tables or databases that contain external tables.

  You must drop all the external tables before you use the **onunload** utility.
- To move tables and databases that contain extended or smart-large-object data types

Requirements for using the onload and onunload utilities

The **onload** and **onunload** utilities have limitations. You can use these utilities only to move data between database servers of the same version on the same operating system. You cannot modify the database schema, logging must be turned off, and the utilities can be difficult to use.

The **onload** and **onunload** utilities have the following requirements:

- The original database and the target database must be from the same version of the database server. You cannot use the **onload** and **onunload** utilities to move data from one version to another version.
- You cannot use **onload** and **onunload** to move data between different types of database servers.
- The **onload** command must have the same scope as the corresponding **onunload** command that unloaded the same table or tables that **onload** references. You cannot, for example, use **onunload** to unload an entire database, and then use **onload** to load only a subset of the tables from that database.
- Do not use **onload** and **onunload** to move data if the database contains extended or smart-large-object data types. (Use the HPL instead to move the data.)
- Because the tape that **onload** reads contains binary data that is stored in disk-page-sized units, the computers where the original database resides (where you use **onunload**) and where the target database will reside (where you use **onload**) must have the same page size, the same representation of numeric data, the same byte alignment for structures and unions.
- You cannot use **onload** and **onunload** to move data between non-GLS and GLS locales.
- You cannot use **onload** and **onunload** on servers in high-availability clusters.
- You cannot use **onload** and **onunload** if you compressed tables or fragments.

You can use **onunload** and **onload** to move data between databases if the NLS and GLS locales are identical. For example, if both the NLS and GLS tables were created with the same French locale, **onload** and **onunload** can move data. However, if user A has a French locale NLS table on server A and tries to load data into a German locale GLS table on server B, **onload** reports errors.

If the page sizes are different, **onload** fails. If the alignment or numeric data types on the two computers are different (for example, with the most significant byte as last instead of first, or different float-type representations), the contents of the data page could be misinterpreted.

How the onunload and onload utilities work

The **onunload** utility, which unloads data from a database, writes a database or table into a file on tape or disk. The **onload** utility loads data that was created with the **onunload** command into the database server.

The **onunload** utility unloads the data in binary form in disk-page units, making this utility more efficient than **dbexport**.

You can use the **onunload** utility to move data between computers that have the same version of the database server.

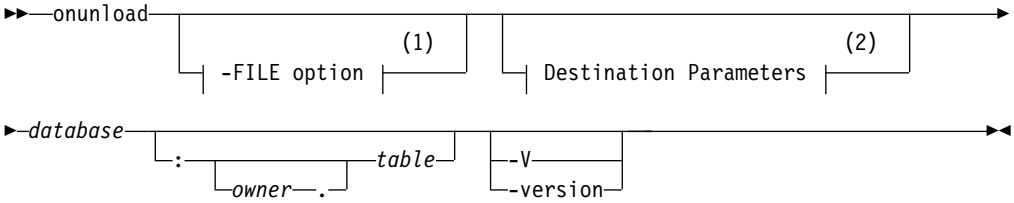
Important: You cannot use the **onload** and **onunload** utilities to move data from one version of a database server to another or between different types of database servers. In addition, the **onload** command must have the same scope as the corresponding **onunload** command that unloaded the same table or tables that **onload** references. You cannot, for example, use **onunload** to unload an entire database, and then use **onload** to load only a subset of the tables from that database.

The **onload** utility creates a database or table in a specified dbspace. The **onload** utility then loads it with data from an input tape or disk file that the **onunload** utility creates.

During the load, you can move simple large objects that are stored in a blobspace to another blobspace.

Syntax of the onunload command

The **onunload** command unloads data from a database and writes a database or table into a file on tape or disk.



Notes:

1 See The -FILE option.

2 See "onunload destination parameters" on page 13-4

Element	Purpose	Key Considerations
database	Specifies the name of a database	**Additional Information**: The database name cannot be qualified by a database server name (*database@dbservername*). **References**: Syntax must conform to the Identifier segment; see Identifier.
owner.	Specifies the owner of the table	**Additional Information**: The owner name must not include invalid characters. **References**: For path name syntax, see your operating-system documentation.

Element	Purpose	Key Considerations
table	Specifies the name of the table	**Requirement**: The table must exist. **References**: Syntax must conform to the Identifier segment; see Identifier.

If you do not specify any destination parameter options, **onunload** uses the device that TAPEDEV specifies. The block size and tape size are the values specified as TAPEBLK and TAPESIZE, respectively. (For information about TAPEDEV, TAPEBLK, and TAPESIZE, see your *IBM Informix Administrator's Reference*.)

The **-V** option displays the software version number and the serial number. The **-version** option extends the **-V** option to display additional information about the build operating system, build number, and build date.

onunload destination parameters

The **onunload** utility supports tape or file destination options.

The following syntax diagram fragment shows **onunload** destination parameters

Destination parameters:

Notes:

1 Only one occurrence of each option allowed. More than one option can occur in a single invocation.

Element	Purpose	Key Considerations
-b *blocksize*	Specifies in kilobytes the block size of the tape device	**Requirement**: The ***blocksize*** must be an integer. **Additional Information**: This option overrides the default value in TAPEBLK or LTAPEBLK.
-l	Directs **onunload** to read the values for tape device, block size, and tape size from LTAPEDEV, LTAPEBLK, and LTAPESIZE, respectively	None.
-s *tapesize*	Specifies in kilobytes the amount of data that can be stored on the tape	**Requirement**: The ***tapesize*** must be an integer. To write to the end of the tape, specify a tape size of `0`. If you do not specify `0`, then the maximum ***tapesize*** is 2 097 151 KB. **Additional Information**: This option overrides the default value in TAPESIZE or LTAPESIZE.
-t *source*	Specifies the path name of the file on disk or of the tape device where the input tape is mounted	**Additional Information**: This option overrides the tape device specified by TAPEDEV or LTAPEDEV. The path name must be a valid path name.

Constraints that affect onunload

When you use the **onunload** utility, you must be aware of constraints that affect how you load the data on the **onunload** tape.

The following constraints apply to **onunload**:

- You must load the data on the **onunload** tape into a database or table that your database server manages.
- You cannot use **onunload** and **onload** if the databases contain extended data types.
- You must load the tape that **onunload** writes onto a computer with the same page size and the same representation of numeric data as the original computer.
- You must read the file that **onunload** creates with the **onload** utility of the same version of your database server. You cannot use **onunload** and **onload** to move data from one version to another.
- When you unload a complete database, you cannot modify the ownership of database objects (such as tables, indexes, and views) until after you finish reloading the database.
- When you unload and load a table, **onunload** does not preserve access privileges, synonyms, views, constraints, triggers, or default values that were associated with the original tables. Before you run **onunload**, use the **dbschema** utility to obtain a listing of the access privileges, synonyms, views, constraints, triggers, and default values. After you finish loading the table, use **dbschema** to re-create the specific information for the table.

Privileges for database or table unloading

To unload a database, you must have DBA privileges for the database or be user **informix**. To unload a table, you must either own the table, have DBA privileges for the database in which the table resides, or be user **informix**.

User **root** does not have special privileges with respect to **onunload** and **onload**.

Tables that are unloaded with a database

If you unload a database, all of the tables in the database, including the system catalog tables, are unloaded.

All triggers, SPL routines, defaults, constraints, and synonyms for all of the tables in the database are also unloaded.

Data that is unloaded with a table

If you unload a table, **onunload** unloads the table data and information from the **systables**, **systables**, **syscolumns**, **sysindexes**, and **sysblobs** system catalog tables.

When you unload a table, **onunload** does not unload information about constraints, triggers, or default values that are associated with a table. In addition, access privileges that are defined for the table and synonyms or views that are associated with the table are not unloaded.

Locking during unload operation

During the unload operation, the database or table is locked in shared mode. An error is returned if **onunload** cannot obtain a shared lock.

The **onload** utility creates a database or table in a specified dbspace. The **onload** utility then loads it with data from an input tape or disk file that the **onunload** utility creates.

Logging mode

The **onunload** utility does not preserve the logging mode of a database. After you load the database with **onload**, you can make a database ANSI compliant or add logging.

For information about logging modes, refer to the *IBM Informix Guide to SQL: Syntax*.

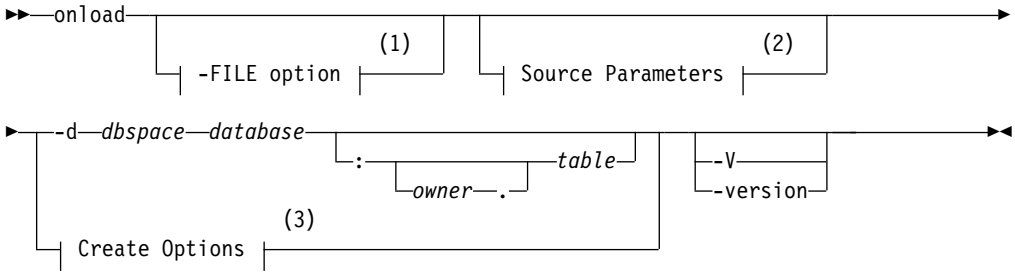
During the load, you can move simple large objects that are stored in a blobspace to another blobspace.

If you do not specify any source-parameter options, **onload** uses the device that is specified as TAPEDEV. The block size and tape size are the values that are specified as TAPEBLK and TAPESIZE, respectively. (For more information about TAPEDEV, TAPEBLK, and TAPESIZE, refer to your *IBM Informix Administrator's Guide*.)

If you do not specify creation options, **onload** stores the database or table in the root dbspace.

Syntax of the onload command

The **onload** command loads data that was created with the **onunload** command into the database server.



Notes:

1 See The -FILE option.

2 See "onload source parameters" on page 13-7

3 See "onload create options" on page 13-8

Element	Purpose	Key Considerations
-d *dbspace*	Loads a database or table into the specified dbspace	The tape being loaded must contain the specified database or table.
database	Specifies the name of the database	The database name cannot include a database server name, such as *database@dbservername*. **References**: Syntax must conform to the Identifier segment; see Identifier.

Element	Purpose	Key Considerations
owner.	Specifies the owner of the table	The owner name must not include invalid characters. **References**: For path name syntax, refer to your operating-system documentation.
table	Specifies the name of the table	The table must exist. **References**: Syntax must conform to the Identifier segment; see Identifier.

The **-V** option displays the software version number and the serial number. The **-version** option extends the **-V** option to display additional information about the build operating system, build number, and build date.

onload source parameters

The **onload** command includes options for specifying information about the tape or file source.

The following syntax diagram fragment shows **onload** source parameters.

Source parameters:

Notes:

1 Only one occurrence of each option allowed. More than one option can occur in a single invocation.

Element	Purpose	Key Considerations
-b *blocksize*	Specifies in kilobytes the block size of the tape device	**Requirements**: Unsigned integer. Must specify the block size of the tape device. **Additional Information**: This option overrides the default value in TAPEBLK or LTAPEBLK.
-l	Directs **onload** to read the values for tape device, block size, and tape size from the configuration parameters LTAPEDEV, LTAPEBLK, and LTAPESIZE, respectively	**Additional Information**: If you specify **-l**, and then **-b**, **-s**, or **-t**, the value that you specify overrides the value in the configuration file.
-s *tapesize*	Specifies in kilobytes the amount of data that the database server can store on the tape	**Requirements**: Unsigned integer. To write to the end of the tape, specify a tape size of `0`. If you do not specify `0`, then the maximum ***tapesize*** is 2 097 151 KB. **Additional Information**: This option overrides the default value in TAPESIZE or LTAPESIZE.

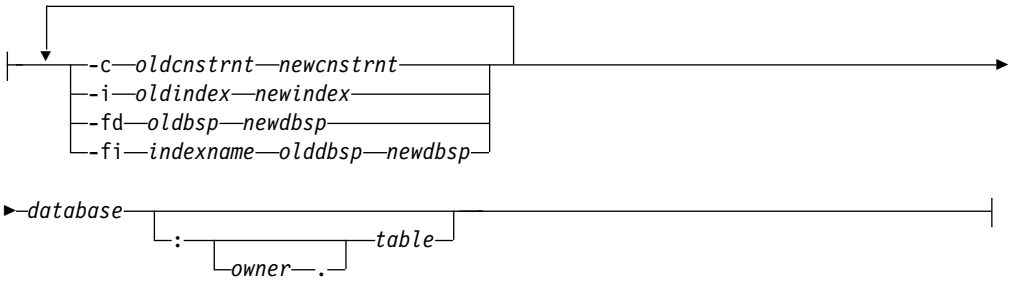
Element	Purpose	Key Considerations
-t *source*	Specifies the path name of the file on disk or of the tape device where the input tape is mounted	Must be a legitimate path name. **Additional Information**: This option overrides the tape device that TAPEDEV or LTAPEDEV specifies. **References**: For path name syntax, see your operating-system documentation.

onload create options

The **onload** command includes information that is used to recreate the database.

The following syntax diagram fragment shows **onload** create options.

Create options:



Element	Purpose	Key Considerations
-c *oldcnstrnt newcnstrnt*	Directs **onload** to rename the specified constraint.	None.
-i *oldindex newindex*	Directs **onload** to rename the table index when it stores the index on disk.	**Additional Information:** Use the **-i** option to rename indexes during the load to avoid conflict with existing index names. **References**: Syntax must conform to the Identifier segment; see Identifier.
-fd *olddbsp newdbsp*	Moves a data fragment from one dbspace to another.	The new dbspace must exist and must not already contain another data fragment for the table. **Additional Information:** This option is used with parallel data query (PDQ) and table fragmentation.
-fi *indexname olddbs newdbsp*	Moves index fragments from one dbspace to another.	The new dbspace must exist and must not already contain another index fragment for the table. **Additional Information:** This option is used with PDQ and table fragmentation.
database	Specifies the name of the database	**Requirement**: The database name cannot include a database server name, such as *database@dbservername*. **References**: Syntax must conform to the Identifier segment; see Identifier.

Element	Purpose	Key Considerations
owner.	Specifies the owner of the table	**Requirement**: The owner name must not include invalid characters. **References**: For path name syntax, refer to your operating-system documentation.
table	Specifies the name of the table	**Requirement**: The table must not exist. **References**: Syntax must conform to the Identifier segment; see Identifier.

If you do not specify any create options for non-fragmented tables, the **onload** utility stores the database or table in the root dbspace.

For fragmented tables, **onunload** preserves the fragmentation expression for later use by **onload**. Thus an imported table is fragmented in the same way as the original table.

You can use the **-c**, **-i**, **-fd**, and **-fi** options in any order and as often as necessary as long as you use unique pairs.

Constraints that affect onload

The **onload** utility performs faster than the **dbimport**, **dbload**, or LOAD methods. In exchange for this higher performance, **onload** has certain constraints.

The **onload** utility has the following constraints:

- The **onload** utility only creates a new database or table; you must drop or rename an existing database or table of the same name before you run **onload**. During execution, the **onload** utility's prompt will ask you if you want to rename blobspaces.
- The **onload** utility places a shared lock on each of the tables in the database during the load. Although you cannot update a table row with the lock in place, the database is available for queries.
- When you load a complete database, the user who runs **onload** becomes the owner of the database.
- The **onload** utility creates a database without logging; you must initiate logging after **onload** loads the database.
- When you use **onload** to load a table into a logged database, you must turn off logging for the database during the operation.
- For fragmented tables, the dbspace assignment is preserved, unless you override it using the **-fn** option.
- For non-fragmented tables, the **onload** utility attempts to store the table in root dbspace if a target dbspace is not specified with the **-d** option. If storing the table in root dbspace or in the dbspace specified with the **-d** option is not possible due to difference in page sizes, the **onload** utility tries to use a dbspace that has the same dbspace number as the dbspace number of the originally unloaded table. If this dbspace still has a different page size, the load operation will fail.

Logging during loading

When you use the **onload** utility to create tables from an **onunload** input tape, **onload** can load information only into a database without logging. Thus, before you load a table into an existing, logged database, you must end logging for the database.

You also might want to consider loading during off-peak hours. Otherwise, you might fill the logical-log files or consume excessive shared-memory resources. After you load the table, create a level-0 dbspace backup before you resume database logging.

When you use **onload** to create databases from an **onunload** input tape, the databases that result are not ANSI-compliant and do not use transaction logging. You can make a database ANSI compliant or add logging after you load the database.

The **onload** utility performs all its loading within a transaction. This feature allows the changes to be rolled back if an error occurs.

Movement of simple large objects to a blobspace

If you load a table that contains simple large objects stored in a blobspace, the **onload** utility asks you if you want to move them to another blobspace.

If you respond `yes`, **onload** displays the blobspace name where the simple large objects were stored when the tape was created. It then asks you to enter the name of the blobspace where you want the simple large objects stored.

If you enter a valid blobspace name, **onload** moves all simple-large-object columns in the table to the new blobspace. Otherwise, **onload** prompts you again for a valid blobspace name.

Ownership and privileges

When you load a new database, the user who runs the **onload** utility becomes the owner. Ownership within the database (tables, views, and indexes) remains the same as when the database was unloaded to tape with **onunload**.

To load a table, you must have the Resource privilege on the database. When **onload** loads a new table, the user who runs **onload** becomes the owner unless you specify an owner in the table name. (You need the DBA privilege for the database to specify an owner in the table name.)

The **onunload** utility does not preserve synonyms or access privileges. To obtain a listing of defined synonyms or access privileges, use the **dbschema** utility, which Chapter 11, "The dbschema utility," on page 11-1 describes, before you run **onunload**.

Exclusive locking during a load operation

During a load operation, the **onload** utility places an exclusive lock on the new database or table.

Loading proceeds as a single transaction, and **onload** drops the new database or table if an error or system failure occurs.

Moving a database between computers with the onunload and onload utilities

You can use the **onunload** and **onload** utilities to move a complete database from one computer to another.

To move a database from one computer to another:

1. Make sure that the page size, numeric representations, and byte alignment on structures and unions are the same on both computers.

   The page size is 2 KB on certain UNIX systems and 4 KB on Windows. For information about page size, see your *IBM Informix Administrator's Guide*. The numeric representation and the byte alignment are characteristics of your operating system. For information about numeric representation and byte alignment, refer to the manuals for your operating systems.
2. Decide where to store the unloaded data:
   - **On disk.** Create an empty file for **onunload** to hold the data. Make sure that you have write permission for the file.
   - **On tape.** Use the tape device and characteristics specified in the ONCONFIG configuration file by either the TAPEDEV or LTAPEDEV configuration parameter, or specify another tape device. Make sure that the tape device that you specify is available for **onunload**. However, if you set the TAPEDEV configuration parameter to STDIO, the **onunload** utility will not be able to unload data.
3. Run the **oncheck** utility to make sure that your database is consistent.

   For information about **oncheck**, see your *IBM Informix Administrator's Reference*.
4. Run the **onunload** utility to unload the data from the database.

   For details on the syntax of the **onunload** command, see "Syntax of the onunload command" on page 13-3.
5. If necessary, transfer the storage medium (tape or disk) to the new computer. If the two computers are on the same network, you can read or write the data remotely.
6. Run the **onload** utility to load the data into the new database.

   For details on the syntax of the **onload** command, see "Syntax of the onload command" on page 13-6.
7. Set the logging status for the new database.

   For information about logging status, see your *IBM Informix Administrator's Guide*.
8. If necessary, change the DBA privileges of the database.
9. Create a level-0 backup of the new database.

Moving a table between computers with the onunload and onload utilities

You can use the **onunload** and **onload** utilities to move a table from one computer to another.

To move a table from one computer to another:

1. Make sure that the page size, numeric representations, and byte alignment on structures and unions are the same on both computers. (The page size is 2 KB on certain UNIX systems and 4 KB on Windows.)

2. Decide where to store the unloaded data.
3. Run the **oncheck** utility to make sure that your database is consistent.
4. If you want to save the triggers, access privileges, SPL routines, defaults, constraints, and synonyms for the table, run the **dbschema** utility.
5. Run the **onunload** utility.

   For details on the syntax of the **onunload** command, see "Syntax of the onunload command" on page 13-3.
6. If necessary, transfer the storage medium to the new computer.
7. If the table includes simple large objects that are stored in blobspaces, decide where to store the simple large objects. If necessary, create new blobspaces.
8. Turn off logging.

   When you are loading a table, logging on the target database must be turned off. (When you are creating and loading an entire database, the logging status does not matter.)
9. Run the **onload** utility.

   For details on the syntax of the **onload** command, see "Syntax of the onload command" on page 13-6.
10. Create a level-0 backup of the modified database.
11. Turn logging back on, if you want logging.
12. If you want to restore the triggers, access privileges, SPL routines, defaults, constraints that are not preserved, and synonyms for the table, run the **dbschema** utility or recreate these objects manually.

    Constraints such as primary keys or default values are preserved, even for a single table. Foreign keys, access privileges, SPL routines and synonyms are not preserved.

Moving a table between dbspaces with the onunload and onload utilities

You can use the **onunload** and **onload** utilities to move a table from one dbspace to another dbspace on the same computer.

To move a table from one dbspace to another dbspace on the same computer:

1. Run the **onunload** utility to unload the table.

   For details on the syntax of the **onunload** command, see "Syntax of the onunload command" on page 13-3.
2. Turn off logging.

   When you are loading a table, logging on the target database must be turned off.
3. Run the **onload** utility.

   Specify a new table name and new dbspace name in the **onload** command.

   For details on the syntax of the **onload** command, see "Syntax of the onload command" on page 13-6.
4. If the data loads successfully, delete the old table in the old dbspace and rename the new table to the old table name.
5. Create a level-0 backup of the modified database.
6. Turn logging back on, if you want logging.

Chapter 14. The onmode utility reversion option

You use the **-b** option of the **onmode** utility to revert to the older database server from which you converted.

What the onmode -b command does

When you convert a database server, several modifications make the format of the databases incompatible with the older version. The **onmode -b** command modifies data so that the earlier version of the database server can access it.

When you convert a database server, several modifications make the format of the databases incompatible with the older version. The **onmode -b** command modifies data so that the earlier version of the database server can access it. In some cases the format of the databases is compatible between versions and the **onmode -b** command is not needed. Type **onmode -b** to see the usage message for options that are available for your database server.

The utility does not revert changes made to the layout of the data that do not affect compatibility.

You must revert the databases before users can access the data with the earlier database server version.

For information about other **onmode** options, see The onmode utility in your *IBM Informix Administrator's Reference*.

Related concepts:

"Run the reversion utility" on page 7-13

Preparation for using the onmode -b command

Before you use the **onmode -b** command, notify users that you are going to bring the database server offline. The reversion utility forcibly removes all users and shuts down the database server.

The **onmode -b** command includes an implicit **-yuk** command.

Make sure that the **INFORMIXSERVER** environment variable is set to the correct database server.

UNIX/Linux Only
You must be user **root** or user **informix** to run **onmode**.

Windows Only
You must be a member of the **Informix-Admin** group to run **onmode**.

Related concepts:

"Run the reversion utility" on page 7-13

Syntax of the onmode -b command

The **onmode -b** command restores your databases to the version of Informix from which you converted. You cannot use this command to revert to any other version of the server.

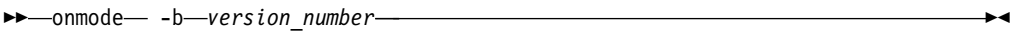
When you convert a database server, several modifications make the format of the databases incompatible with the older version. The **onmode -b** command modifies data so that the earlier version of the database server can access it. In some cases the format of the databases is compatible between versions and the **onmode -b** command is not needed.

Tip: To see a list of all of the versions to which you can revert, run this command:

```
onmode -b
```

When you see the options that are available, choose the option that is closest to the version that you want.

Syntax



Element	Purpose
-b *version_number*	Reverts the database to the specified version.

Related concepts:

"Run the reversion utility" on page 7-13

Chapter 15. The onrestorept utility

You can use the **onrestorept** utility to restore the database server back to the state that it was in just before the start of the failed upgrade.

The utility depends on these configuration parameters being set correctly before you attempt to upgrade the database server:

- The CONVERSION_GUARD configuration parameter must be set to 1 or 2 (the default value) for data to be stored during an upgrade. If the conversion guard operations fail (for example, because the server has insufficient space to store the data that is captured during the upgrade), you cannot use the **onrestorept** utility.
- The RESTORE_POINT_DIR configuration parameter must specify a directory where the conversion guard utility can store data files during the upgrade. Those files are needed to restore the database server to a consistent state after a failed upgrade. This directory must be empty before the upgrade starts. After a successful upgrade, the contents of the directory are automatically removed.

Important: Informix must be offline when you run the **onrestorept** utility. Do not start the server until the utility finishes running. Executing the **onrestorept** utility when the server is online, or starting the server before the utility finishes running, can damage the database and requires you to restore the database server from a backup copy.

To start Enterprise Replication after the **onrestorept** utility restores the database server to a consistent state, you must use the **cdr cleanstart** command.

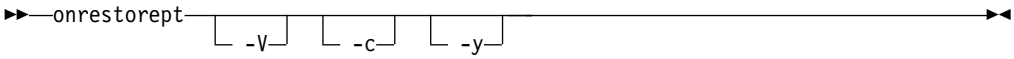
Related tasks:

"Restoring to a previous consistent state after a failed upgrade" on page 6-4

"Preparing for migration" on page 3-1

Syntax of the onrestorept command

The **onrestorept** command undoes changes made during a failed upgrade, restoring files to the state they were in when you shut down the server.



Element	Purpose	Key Considerations
-V	Display the version of the current server and the software serial number.	
-c	After a failed upgrade, delete the files in the directory specified in the RESTORE_POINT_DIR configuration parameter.	Before you begin another upgrade, you must delete these restore point files. Do this before you make another migration attempt, but not before your run the **onrestorept** utility to recover the files (if possible). If the upgrade was successful, restore point files are automatically deleted and there is no need to run **onrestorept -c**.

Element	Purpose	Key Considerations
-y	Automatically accept every prompt while the **onrestorept** command runs.	If you do not specify **-y**, you must respond to every prompt.

Examples

The following command restores Informix files after a failed upgrade:

```
onrestorept
```

The following command removes restore point files after a failed upgrade:

```
onrestorept -c
```

Part 5. New and changed features in Informix servers

Each version of the Informix database server contains new features, and new and changed environment variables, configuration parameters, SQL reserved words, system catalogs, and system databases. Some of these changes might affect your applications.

Descriptions of the new, changed, and discontinued features for each version of Informix are available on the web:

- Informix 12.10 http://www.ibm.com/support/knowledgecenter/SSGU8G_12.1.0/com.ibm.po.doc/new_features_ce.htm
- Informix 11.70 http://www.ibm.com/support/knowledgecenter/SSGU8G_11.70.0/com.ibm.po.doc/new_features.htm
- Informix 11.50 http://www.ibm.com/support/knowledgecenter/SSGU8G_11.50.0/com.ibm.po.doc/new_features.htm
- Informix 11.10 http://www.ibm.com/support/knowledgecenter/SSGU8G_11.50.0/com.ibm.gsg.doc/ids_gsg_167.htm
- Informix 10.00 and earlier, see the release notes that can be downloaded from http://www.ibm.com/support/docview.wss?uid=swg27040460

Specific changes that were made from release to release are listed in the following topics.

Chapter 16. Environment variable changes by version

This version of Informix contains new environment variables and session environment options that might affect your environment. It also contains some changes to existing environment variables.

For more information about environment variables, see the *IBM Informix Guide to SQL: Reference* and your *IBM Informix Administrator's Guide*.

Table 16-1 lists the new or changed environment variables or session environment options in various versions of Informix.

Table 16-1. New or changed environment variables or session environment options

Version	Environment Variable	Description
12.10.xC6	IFX_SOC_KEEPALIVE	New environment variable for Informix JDBC Driver version 4.10.JC6. When set to `true`, sets the TCP property SO_KEEPALIVE on the socket for open connections. This setting is useful to keep long running idle socket connections from timing out due to inactivity.
12.10.xC5	IFX_AUTO_REPREPARE	The IFX_AUTO_REPREPARE session environment option supports new values that you can use to control how much checking takes place, and when it takes place. 3 = don't check statements that were successfully executed recently (optimistic mode) 5 = check only after update statistics are run 7 = both 3 and 5
12.10.xC4	IFX_PUA_DISPLAY_MAPPING	New environment variable for GLS 6.00.xC4. Ensures that DB-Access and other character-based applications use a mapping file to determine the display width for characters in Unicode Private-Use Area (PUA) ranges.
12.10.xC4	IFX_SESSION_LIMIT_LOCKS	The IFX_SESSION_LIMIT_LOCKS option can be used with the SET ENVIRONMENT SQL statement to override the SESSION_LIMIT_LOCKS configuration parameter for the current session.
12.10.xC3	INFORMIXCONRETRY	The INFORMIXCONRETRY option can be used with the SET ENVIRONMENT SQL statement to override the INFORMIXCONRETRY environment variable for the current session.

Table 16-1. New or changed environment variables or session environment options (continued)

Version	Environment Variable	Description
12.10.xC3	INFORMIXCONTIME	The INFORMIXCONTIME option can be used with the SET ENVIRONMENT SQL statement to override the INFORMIXCONTIME environment variable for the current session.
12.10.xC3	USE_DWA	The new **uniquecheck** parameter controls uniqueness checking during the creation of a data mart.
12.10.xC2	DBTIME	In 12.10.xC1 and earlier release versions, the %F directive inserted by default the ASCII 46 character (.) between the SECOND and FRACTION field values. Starting in 12.10.xC2, however, the %F directive does not include a separator by default.
12.10.xC2	GL_DATETIME	In 12.10.xC1 and earlier release versions, the %F directive inserted by default the ASCII 46 character (.) between the SECOND and FRACTION field values. Starting in 12.10.xC2, however, the %F directive does not include a separator by default.
12.10.xC2	IFX_BAR_NO_BSA_PROVIDER	To be set only at the request of IBM Software Support. Forces ON-Bar to use the `sm_versions` file as the source of information about the XBSA library for the storage manager.
12.10.xC2	IFX_BAR_NO_LONG_BUFFERS	To be set only at the request of IBM Software Support. Prevents the size of transfer buffers from exceeding 64 KB when the BAR_XFER_BUF_SIZE configuration parameter is set to a long transfer buffer size value.
12.10.xC2	IFX_BAR_USE_DEDUP	Optimizes the deduplication capabilities of storage managers.
12.10.xC2	IFX_TSM_OBJINFO_OFF	Disables support for restoring backup objects that are replicated, imported, or exported between TSM servers.
12.10.xC1	PSM_ACT_LOG	Specifies the location of the IBM Informix Primary Storage Manager activity log for your environment, overriding the value of the PSM_ACT_LOG configuration parameter, for example, for a single session.
12.10.xC1	PSM_CATALOG_PATH	Specifies the location of the storage manager catalog tables for your environment, overriding the value of the PSM_CATALOG_PATH configuration parameter, for example, for a single session.

Table 16-1. New or changed environment variables or session environment options (continued)

Version	Environment Variable	Description
12.10.xC1	PSM_DBS_POOL	Changes the name of the pool in which the storage manager places backup and restore dbspace data for your environment, overriding the value of the PSM_DBS_POOL configuration parameter, for example, for a single session.
12.10.xC1	PSM_DEBUG	Specifies the amount of debugging information that prints in the storage manager debug log for your environment, overriding the value of the PSM_DEBUG configuration parameter, for example, for a single session.
12.10.xC1	PSM_DEBUG_LOG	Specifies the location of the storage manager debug log for your environment, overriding the value of the PSM_DEBUG_LOG configuration parameter, for example, for a single session.
12.10.xC1	PSM_LOG_POOL	Changes the name of the pool in which the storage manager places backup and restore log data for your environment, overriding the value of the PSM_LOG_POOL configuration parameter, for example, for a single session.
11.70.xC1	IFX_UNLOAD_EILSEQ_MODE	Enables DB-Access, the **dbexport** utility, and the High Performance Loader (HPL) to use character data that is invalid for the locale specified in the environment.
11.70.xC1	LOGINTIMEOUT (supported by the client JDBC driver)	Immediately establishes a connection to the Informix database server if the server is running. If the server is not running, this environment variable specifies how long, in milliseconds, the server port is polled to establish a connection.
11.70.xC1	TRUSTED_CONTEXT (supported by the client JDBC driver)	Specifies if a trusted connection can be established between the database server and the client.
11.50.xC4	IFX_LARGE_PAGES (AIX® and Solaris)	Enables the use of large pages for non-message shared memory segments that are resident in physical memory. When large pages have been configured by operating system commands and the RESIDENT configuration parameter is set appropriately, this feature can offer significant performance benefits for large memory configurations.

Table 16-1. New or changed environment variables or session environment options (continued)

Version	Environment Variable	Description
11.50.xC4	IFX_NO_SECURITY_CHECK	Turns off the utilities that check the security of $INFORMIXDIR when the database server is started. Use this environment variable only when necessary to fix a security flaw in your Informix installation.
11.50.xC4	ONINIT_STDOUT (Windows)	Captures the output of the **oninit** command on Windows systems.
11.50.xC3	IFX_LOB_XFERSIZE	Provides error checking when transmitting large CLOB or BLOB data types from clients to the database server.
11.50.xC3	CDR_DISABLE_SPOOL	Prevents the generation of ATS and RIS files.
11.50.xC3	CDR_ATSRISNAME_DELIM	Sets the delimiter for the timestamp portion of the ATS and RIS file names.
11.50.xC3	IFX_NOT_STRICT_THOUS_SEP	Removes enforcement of the restriction that three digits must exist after the thousand separator.
11.10	IFX_AUTO_REPREPARE	Controls whether the database server automatically recompiles prepared objects and reoptimizes SPL routines that reference tables whose schemas change Enabling the IFX_AUTO_REPREPARE session environment variable can avoid many -710 errors, and can reduce the number of manual reprepare and reoptimize operations after the schema of a table is modified
11.10	IFX_NODBPROC	An environment variable that enables or prevents the execution of a **sysdbopen( )** or **sysdbclose( )** procedure
10.00.xC4	BAR_SORT_DBS	A variable (used only in Version 10.00.xC4 and later Version 10.00 fix packs) for backup and restore operations when the scope is not the whole system.
10.0	IFX_EXTDIRECTIVES	A client-side external optimizer directive to use as a temporary solution to problems when you do not want to change SQL statements in queries
10.0	IFX_NO_TIMELIMIT_ WARNING	Supports time-limited license
10.0	IFX_ONPLOAD_AUTO_ UPGRADE	Automatically upgrades the **onpload** database the first time you start the HPL utility with the **ipload** or **onpladm** command after you migrate to a new database server version
10.0	STDIO	A TAPEDEV configuration parameter variable that improves the speed of high-availability cluster setup

Related tasks:

“Completing required post-migration tasks” on page 6-5

Chapter 17. Configuration parameter changes by version

Each version of Informix contains new configuration parameters that might affect your installation.

Each version of IBM Informix includes a new `onconfig.std` template file with new default values or other changes for some configuration parameters. In addition, some configuration parameters, such as those used with earlier versions of the database server, might be deprecated or removed from the database server.

After you upgrade, use the new `onconfig.std` file. You can customize it as necessary to match the configuration of the prior version of your database. Do not use the old `onconfig.std` file with the new version of the server.

If you want to revert to a prior version of the server, you must either replace the Informix Version 12.10 ONCONFIG configuration file with the ONCONFIG file that you used before you converted, or you must remove configuration parameters that the earlier database server does not support.

For more information about the configuration parameters, see the *IBM Informix Administrator's Reference* and the *IBM Informix Administrator's Guide*.

Related concepts:

"Customizing configuration files" on page 6-3

Related tasks:

"Completing required post-migration tasks" on page 6-5

Deprecated and discontinued configuration parameters

Due to changes in related functionality, the introduction of new functionality, or the removal of support, some Informix configuration parameters that are available in earlier releases are either deprecated or discontinued. Review the summary of the changes to understand the overall impact on your environment.

Deprecated configuration parameters

During migration be aware of the configuration parameters that are deprecated. Support for these configuration parameters might be removed in a later release. Avoid creating new dependencies that rely on these configuration parameters, and if you have existing dependencies on them, develop plans to remove these dependencies.

Discontinued configuration parameters

If you are migrating, be aware of the functions that are no longer supported.

Table 17-1. Deprecated or discontinued configuration parameters, in alphabetical order by name

Parameter	Deprecated in	Discontinued in	Explanation
AFF_NPROCS	9.3	12.10.xC1	Replaced by the VPCLASS configuration parameter.
AFF_SPROC	9.3	12.10.xC1	Replaced by the VPCLASS configuration parameter.

Table 17-1. Deprecated or discontinued configuration parameters, in alphabetical order by name (continued)

Parameter	Deprecated in	Discontinued in	Explanation
BUFFERS	10	12.10.xC1	Replaced by the BUFFERPOOL configuration parameter.
CDR_LOGBUFFERS		9.3	Discontinued.
CDR_LOGDELTA		9.3	Discontinued.
CDR_NIFRETRY		9.3	Discontinued.
CDR_NUMCONNECT		9.3	Discontinued.
CDR_QDATA_SBFLAGS		9.4	Enterprise Replication uses the default log mode of the sbspace for spooling row data.
DRAUTO		9.3	You must manually transition from HDR secondary to standard mode.
DRNODE		12.10.xC1	This parameter is not granular enough for high-availability clusters and the secondary servers in such clusters.
FAST_RESTART_CKPT_FUZZYLOG		11.10.xC1	The RTO_SERVER_RESTART configuration parameter eliminates fuzzy checkpoints, and it uses interval checkpoints instead.
FAST_RESTART_PHYSLOG		11.10.xC1	The RTO_SERVER_RESTART configuration parameter eliminates fuzzy checkpoints, and it uses interval checkpoints instead.
JDKVERSION	11.5	12.10.xC1	Discontinued.
JVPHOME	11.5	To be determined	Deprecated.
JVPJAVAHOME	11.5	To be determined	Deprecated.
JVPJAVALIB	11.5	To be determined	Deprecated.
JVPJAVAVM	11.5	To be determined	Deprecated.
LBU_PRESERVE		9.3	The **onarchive** utility is out of support.
LOGSMAX		9.3	The fixed-size logfile array was replaced with a log list that can be added dynamically with the DYNAMIC_LOGS configuration parameter.
LRU_MAX_DIRTY	10	12.10.xC1	Replaced by the BUFFERPOOL configuration parameter.
LRU_MIN_DIRTY	10	12.10.xC1	Replaced by the BUFFERPOOL configuration parameter.
LRUPOLICY		12.10.xC1	Replaced by the AUTO_LRU_TUNING configuration parameter.
LRUS	10	12.10.xC1	Replaced by the BUFFERPOOL configuration parameter.
NOAGE	9.3	12.10.xC1	Replaced by the VPCLASS configuration parameter.

Table 17-1. Deprecated or discontinued configuration parameters, in alphabetical order by name (continued)

Parameter	Deprecated in	Discontinued in	Explanation
NOFUZZYCKPT		11.10.xC1	The RTO_SERVER_RESTART configuration parameter eliminates fuzzy checkpoints, and it uses interval checkpoints instead.
NUMAIOVPS	9.3	12.10.xC1	Replaced by the VPCLASS configuration parameter.
NUMCPUVPS	9.3	12.10.xC1	Replaced by the VPCLASS configuration parameter.
OPCACHEMAX		12.10.xC1	Optical storage is not supported since the optical subsystem was discontinued.
OPTICAL_LIB_PATH		12.10.xC1	Optical storage is not supported since the optical subsystem was discontinued.
PHYSDBS	11.10.xC1	11.50.xC1	You must move the physical log with the server online.
RA_PAGES	12.10.xC1	To be determined	Replaced by the AUTO_READAHEAD configuration parameter.
RA_THRESHOLD		12.10.xC1	Replaced by the AUTO_READAHEAD configuration parameter.
SPINCNT	7.3	12.10.xC1	Use the MULTIPROCESSOR configuration parameter to specify whether the database server performs locking that is suitable for a multiprocessor computer.
STAGEBLOB		12.10.xC1	Optical storage is not supported since the optical subsystem was discontinued.

Related reference:

"Configuration parameter changes in Version 12.10" on page 17-4

"Configuration parameter changes in Version 11.70" on page 17-8

"Configuration parameter changes in Version 11.50" on page 17-12

"Configuration parameter changes in Versions 11.10, 10.00, and earlier" on page 17-18

Related information:

VPCLASS configuration parameter

BUFFERPOOL configuration parameter

AUTO_READAHEAD configuration parameter

DYNAMIC_LOGS configuration parameter

RTO_SERVER_RESTART configuration parameter

MULTIPROCESSOR configuration parameter

AUTO_LRU_TUNING configuration parameter

Configuration parameter changes in Version 12.10

IBM Informix Version 12.10 contains some configuration parameter changes, including changes about how you use configuration parameters. Additionally, with this version, the `onconfig.std` file is no longer used when the server starts.

In Version 12.10:

- The database server no longer uses `onconfig.std` values at startup when values are not in the current `%INFORMIXDIR%\etc\%ONCONFIG%` or `$INFORMIXDIR/etc/$ONCONFIG` file. If any configuration parameter values are missing when the server starts, the server automatically uses the default value for those parameters.
- You can use environment variables as configuration parameter values.
- You can import and export configuration files.
- You can modify many more configuration parameters with the **onmode -wm** or **onmode -wf** commands.

Configuration parameters added in Informix 12.10

The following table lists the configuration parameters that were added in Informix 12.10. All parameters are in the `onconfig.std` file, unless otherwise noted.

Table 17-2. Configuration parameters added in Informix 12.10

Version	Configuration Parameter	Description
12.10.xC6	BAR_MAX_RESTORE	You can set the number of parallel processes to run during a restore independently from the number of processes for a backup.
12.10.xC6	IFXGUARD	You can enable auditing with IBM Security Guardium®.
12.10.xC6	SHARD_ID	You can enable parallel sharded queries by giving each shard server a unique ID.
12.10.xC6	SHARD_MEM	You can customize how shared memory is allocated for parallel sharded queries on each shard server.
12.10.xC6	SMX_NUMPIPES	You can reduce latency between shard or high-availability servers by increasing the number of pipes for SMX connections.
12.10.xC6	TENANT_LIMIT_CONNECTIONS	You can limit the number of client connections to a tenant database.
12.10.xC6	TENANT_LIMIT_MEMORY	You can limit the amount of shared memory for all sessions that are connected to the tenant database.
12.10.xC5	SESSION_LIMIT_TXN_TIME	You can specify the maximum number of seconds that a transaction can run.
12.10.xC5	SESSION_LIMIT_LOGSPACE	You can specify the maximum amount of log space that a transaction can fill.
12.10.xC5	SESSION_LIMIT_TEMPSPACE	You can specify the maximum amount of temporary storage space that can be allocated for a session.

Table 17-2. Configuration parameters added in Informix 12.10 (continued)

Version	Configuration Parameter	Description
12.10.xC5	SESSION_LIMIT_MEMORY	You can specify the maximum amount of shared memory that can be allocated for a session.
12.10.xC5	TENANT_LIMIT_SPACE	You can limit the total amount of permanent storage space for a tenant database.
12.10.xC4	CDR_MEM	For Enterprise Replication, specify whether to allocate memory pools for CPU virtual processors or use a fixed-block memory pool allocation strategy.
12.10.xC4	SESSION_LIMIT_LOCKS	You can prevent users from acquiring too many locks by limiting the number of locks for each user without administrative privileges for a session. This configuration parameter is not in the `onconfig.std` file.
12.10.xC3	AUTO_LLOG	Controls whether to automatically add logical logs in the specified dbspace to improve performance. This configuration parameter is not in the `onconfig.std` file.
12.10.xC3	AUTOLOCATE	Enables the automatic location of databases and tables and the automatic fragmentation of tables.
12.10.xC3	AUTO_TUNE_SERVER_SIZE	Sets the sizes of memory and storage spaces to allocate based on the number of expected concurrent users. This configuration parameter is not in the `onconfig.std` file.
12.10.xC3	CDR_AUTO_DISCOVER	Enables connectivity autoconfiguration for a high-availability cluster or Enterprise Replication domain, or autoconfigures replication.
12.10.xC3	INFORMIXCONRETRY	Specifies the number of connection attempts that can be made to the database server after the initial connection attempt fails. With the INFORMIXCONTIME configuration parameter, specifies the frequency at which the CONNECT statement tries to connect to the database server.
12.10.xC3	INFORMIXCONTIME	Specifies the duration, in seconds, that the CONNECT statement attempts to establish a connection to the database server. With the INFORMIXRETRY configuration parameter, specifies the frequency at which the CONNECT statement tries to connect to the database server.
12.10.xC2	TLS_VERSION	Specifies the version of the Transport Layer Security (TLS) connection.

Table 17-2. Configuration parameters added in Informix 12.10 (continued)

Version	Configuration Parameter	Description
12.10	AUTO_TUNE	Enables or disables all automatic tuning configuration parameters that have values that are not present in the %INFORMIXDIR%\etc\%ONCONFIG% or $INFORMIXDIR/etc/$ONCONFIG file.
12.10	CDR_TSINSTANCEID	Specifies how to generate unique identifiers for time series instances across replication servers.
12.10	PSM_ACT_LOG	Specifies the location of the IBM Informix Primary Storage Manager activity log if you do not want the log information included in the ON-Bar activity log.
12.10	PSM_CATALOG_PATH	Specifies the full path to the directory that contains the Informix Primary Storage Manager catalog tables.
12.10	PSM_DBS_POOL	Specifies the name of the pool in which theInformix Primary Storage Manager places backup and restore dbspace data.
12.10	PSM_DEBUG	Specifies the amount of debugging information that prints in the Informix Primary Storage Manager debug log if you want to use a debug level that is different from the one used by ON-Bar.
12.10	PSM_DEBUG_LOG	Specifies the location of the debug log to which the Informix Primary Storage Manager writes debugging messages if you do not want the log information included in the ON-Bar debug log.
12.10	PSM_LOG_POOL	Specifies the name of the pool in which theInformix Primary Storage Manager places backup and restore log data.
12.10	SDS_ALTERNATE	If set on the primary server and on all SD secondary servers in a high-availability cluster, defines a shared blobspace as an alternative means of communication between the primary server and SD secondary servers when network communication is not available. The shared blobspace can be used to communicate shut-down procedures to a primary server in the case of failover.
12.10	SDS_FLOW_CONTROL	Specifies the boundaries within which flow control is enabled in a high-availability cluster that contains at least one shared-disk secondary server.

Configuration parameters that have new default values

The following table lists the configuration parameters that have new default values in the **onconfig.std** file in version 12.10.

Table 17-3. Configuration Parameters with new default values in the onconfig.std file

Fix pack	Configuration parameter	Previous value	New value
12.10	DRINTERVAL	30	0
12.10	DS_NONPDQ_QUERY_MEM	128	UNIX: 256 Windows: 128
12.10	GSKIT_VERSION	7	Not set. The version of IBM Informix Global Language Support (GLS) that is installed with Informix is used.
12.10	IFX_FOLDVIEW	0	1
12.10	ROOTSIZE	200000	300000
12.10	SDS_LOGCHECK	0	UNIX: 10 Windows: 0

Configuration parameters that have changed values

The following table lists the configuration parameters that have changed values in Version 12.10.

Table 17-4. Configuration parameters that have changed values

Version	Configuration Parameter	Previous Values	New Values
12.10.xC5	TAPESIZE	0 - 4294967296 (4 TB)	0 - 9223372036854775807 (9 ZB)
12.10.xC5	LTAPESIZE	0 - 4294967296 (4 TB)	0 - 9223372036854775807 (9 ZB)
12.10.xC5	AUTO_REPREPARE	Disable (0) or enable (1) automatic repreparation.	In addition to the existing values, the configuration parameter offers three new values that you can use to control how much checking takes place, and when it takes place. 3 = don't check statements that were successfully executed recently (optimistic mode) 5 = check only after update statistics are run 7 = both 3 and 5

Table 17-4. Configuration parameters that have changed values (continued)

Version	Configuration Parameter	Previous Values	New Values
12.10.xC4	VP_MEMORY_CACHE_VP	The default mode was DYNAMIC. The size of private memory caches increased or decreased automatically, as needed.	The default mode is STATIC. The size of private memory caches for CPU virtual processors are limited to the size that you specify in the value of the VP_MEMORY_CACHE_VP configuration parameter.
12.10.xC3	BUFFERPOOL	The size of buffers and LRU queues.	An optional new memory format that allows the database server to expand the buffer pool as needed to improve performance.
12.10.xC3	VPCLASS	The number of VPs.	Automatic addition of virtual processors to improve performance.
12.10.xC3	VP_MEMORY_CACHE_KB	The total size of all private memory caches.	The total size of all private memory caches, optionally followed by a comma and the mode (Dynamic or Static) of the caches.

Related reference:

"Deprecated and discontinued configuration parameters" on page 17-1

Configuration parameter changes in Version 11.70

Informix Version 11.70 contains some configuration parameter changes, including new default values.

New configuration parameters

The following table lists the configuration parameters that were added in Informix 11.70. All parameters are in the `onconfig.std` file, unless otherwise noted.

Table 17-5. New configuration parameters

Version	New Configuration Parameter	Description
11.70.xC8	INFORMIXCONRETRY	Specifies the number of connection attempts that can be made to the database server after the initial connection attempt fails. With the INFORMIXCONTIME configuration parameter, specifies the frequency at which the CONNECT statement tries to connect to the database server.
11.70.xC8	INFORMIXCONTIME	Specifies the duration, in seconds, that the CONNECT statement attempts to establish a connection to the database server. With the INFORMIXRETRY configuration parameter, specifies the frequency at which the CONNECT statement tries to connect to the database server.

Table 17-5. New configuration parameters (continued)

Version	New Configuration Parameter	Description
11.70.xC8	TLS_VERSION	Specifies the version of the Transport Layer Security (TLS) connection.
11.70.xC6	CLUSTER_TXN_SCOPE	If set on the servers in a high-availability cluster, controls whether a transaction commit can be returned to a client application before the transaction is applied in another server session or on another cluster node
11.70.xC6	HA_FOC_ORDER	If set on a primary server in a high-availability cluster, defines a single failover rule to be used by all Connection Managers connecting to that primary server.
11.70.xC6	IFX_XA_UNIQUEXID_IN_ DATABASE	Enables the transaction manager to use same XID to represent global transactions on different databases in the same database server instance.
11.70.xC4	GSKIT_VERSION	Specifies the major version of the IBM Global Security Kit (GSKit) that the database server uses for encryption and SSL communication.
11.70.xC4	SDS_LOGCHECK	Prevents an SD secondary server from taking over the role of the primary server if network communication between the primary and secondary servers is unavailable.
11.70.xC4	S6_USE_REMOTE_SERVER_CFG	Specifies the file that is used to authenticate secure server connections in a non-trusted network environment. S6_USE_REMOTE_SERVER_CFG is used with the REMOTE_SERVER_CFG configuration parameter.
11.70.xC4	USTLOW_SAMPLE	Enables sampling during the gathering of statistics for UPDATE STATISTICS LOW operations.
11.70.xC3	AUTO_READAHEAD	Changes the automatic read-ahead mode or disables automatic read ahead.
11.70.xC3	LOW_MEMORY_MGR	Enables automatic low memory management, which you can use to change the default behavior of the server when it reaches its memory limit.
11.70.xC3	LOW_MEMORY_RESERVE	Reserves a specific amount of memory for use when critical activities (such as rollback activities) are needed and the server has limited free memory.
11.70.xC3	PN_STAGEBLOB_THRESHOLD	Reserves space for BYTE and TEXT data in round-robin fragments.
11.70.xC2	REMOTE_SERVER_CFG	Specifies the name of a file that lists the remote hosts that are trusted by the computer on which the database server resides.
11.70.xC2	REMOTE_USERS_CFG	Specifies the name of a file that lists names of trusted users that exist on remote hosts.

Table 17-5. New configuration parameters (continued)

Version	New Configuration Parameter	Description
11.70.xC1	AUTO_STAT_MODE	Enables or disables the recalculation of distribution statistics.
11.70.xC1	BATCHEDREAD_INDEX	Enables the optimizer to automatically fetch a set of keys from an index buffer.
11.70.xC1	BAR_CKPTSEC_TIMEOUT	Sets the amount of time, in seconds, that an RS secondary server should wait for a checkpoint to arrive from the primary server while performing an external backup.
11.70.xC1	CDR_LOG_LAG_ACTION	Specifies how Enterprise Replication responds to a potential log wrap situation.
11.70.xC1	CDR_LOG_STAGING_MAXSIZE	Specifies the maximum amount of space that Enterprise Replication uses to stage compressed log files in the directory specified by the LOG_STAGING_DIR configuration parameter.
11.70.xC1	DEFAULTESCCHAR	Specifies the default escape character.
11.70.xC1	ENABLE_SNAPSHOT_COPY	Enables or disables the ability to clone a server using the **ifxclone** utility.
11.70.xC1	FAILOVER_TX_TIMEOUT	In high-availability cluster environments, enables transaction survival and indicates the maximum number of seconds after failover that the server should wait before rolling back transactions.
11.70.xC1	FULL_DISK_INIT	Specifies whether or not the disk initialization command (**oninit -i**) can run on your instance when a page zero exists at the root path location.
11.70.xC1	MQCHLLIB	Specifies the path to the directory containing the IBM WebSphere MQ client channel definition table.
11.70.xC1	MQCHLTAB	Specifies the name of the client channel definition table.
11.70.xC1	MQSERVER	Defines a channel, specifies the location of the IBM WebSphere MQ server, and specifies the communication method to be used.
11.70.xC1	NS_CACHE	Defines the maximum retention time for an individual entry in the host name/IP address cache, the service cache, the user cache, and the group cache.
11.70.xC1	NUMFDSERVERS	For network connections on UNIX, specifies the maximum number of poll threads to handle network connections moving between virtual processors (VPs).
11.70.xC1	PRELOAD_DLL_FILE	Specifies the path name for a shared library file that is preloaded when the database server is started.
11.70.xC1	SEQ_CACHE_SIZE	Specifies the maximum number of sequence objects that can have preallocated values in the sequence cache.

Table 17-5. New configuration parameters (continued)

Version	New Configuration Parameter	Description
11.70.xC1	SMX_COMPRESS	Specifies the level of compression that the database server uses before sending data from the source database server to the target database server.
11.70.xC1	SP_AUTOEXPAND	Enable or disables the automatic creation or extension of chunks in a storage space
11.70.xC1	SP_THRESHOLD	Defines the minimum amount of free kilobytes that can exist in a storage space
11.70.xC1	SP_WAITTIME	Specifies the maximum number of seconds that a thread will wait for a storage pool to expand before returning an "out of space" error
11.70.xC1	STATCHANGE	Specifies a percentage of changed rows that triggers the recalculation of distribution statistics.
11.70.xC1	USERMAPPING	Specifies whether or not the database server accepts connections from mapped users.

Configuration parameters that have new default values

The following table lists the configuration parameters that have new default values in the Version 11.70 `onconfig.std` file.

Table 17-6. Configuration parameters with new default values in the `onconfig.std` file

Configuration Parameter	Previous Value	New Value
BATCHEDREAD_TABLE	0	1

Configuration parameters that have changed values

The following table lists the configuration parameters that have changed values in Version 11.70.

Table 17-7. Configuration parameters that have changed values

Version	Configuration Parameter	Previous Values	New Values
11.70.xC9	AUTO_REPREPARE	Disable (0) or enable (1) automatic repreparation.	In addition to the existing values, the configuration parameter offers three new values that you can use to control how much checking takes place, and when it takes place. 3 = don't check statements that were successfully executed recently (optimistic mode) 5 = check only after update statistics are run 7 = both 3 and 5

Table 17-7. Configuration parameters that have changed values (continued)

Version	Configuration Parameter	Previous Values	New Values
11.70.xC8	VP_MEMORY_CACHE_KB	The total size of all private memory caches.	The total size of all private memory caches, optionally followed by a comma and the mode (Dynamic or Static) of the caches.
11.70.xC6	ALRM_ALL_EVENTS	1 and 2	0 (on) and 1 (off)

Related reference:

"Deprecated and discontinued configuration parameters" on page 17-1

Configuration parameter changes in Version 11.50

The **onconfig.std** file was reorganized for Informix Version 11.50. In addition, some configuration parameters were added to the **onconfig.std** file, and some configuration parameters have new default values.

In the Version 11.50 `onconfig.std` file, comments and the parameters are listed separately and are grouped by functional areas. Some configuration parameters that specify sizes now have higher values. Some configuration parameters that specify file locations now have more secure default locations under the **$INFORMIXDIR** directory.

The following table lists the new configuration parameters that were added in Informix 11.50. All of these parameters are in the `onconfig.std` file, unless otherwise noted.

Table 17-8. New configuration parameters added in Version 11.50

Version	New Configuration Parameter	Description
11.50.xC8	NET_IO_TIMEOUT_ALARM	Controls whether to be notified if network write operations are blocked for 30 minutes or more.
11.50.xC8	RSS_FLOW_CONTROL	Specifies the boundaries within which flow control is enabled in a high-availability cluster that contains at least one RS secondary server.
11.50.xC6	BATCHEDREAD_TABLE	Enables or disables light scans on compressed tables, tables with rows that are larger than a page, and tables with any type of data, including VARCHAR, LVARCHAR, and NVARCHAR data.
11.50.xC6	CONVERSION_GUARD	Enables changes made during an upgrade to a new version of the server and the upgrade fails.
11.50.xC6	RESTORE_POINT_DIR	Specifies the path of the directory where all restore-point files are located if you are undoing changes made during an upgrade that failed. This directory must be empty, and the server offline, before the upgrade begins. The server stores restore point files in a subdirectory of the specified directory, with the server number as the subdirectory name.

Table 17-8. New configuration parameters added in Version 11.50 (continued)

Version	New Configuration Parameter	Description
11.50.xC6	SB_CHECK_FOR_TEMP	Prevents the copying of a temporary smart large object into a permanent table.
11.50.xC5	DELAY_APPLY	Used to configure RS secondary servers to wait for a specified period of time before applying logs.
11.50.xC5	LOG_STAGING_DIR	Specifies the location of log files received from the primary server when configuring delayed application of log files on RS secondary servers.
11.50.xC5	STOP_APPLY	Used to stop an RS secondary server from applying log files received from the primary server.
11.50.xC5	SQL_LOGICAL_CHAR	When enabled, causes size specifications in the declarations of character data types to be interpreted in units of logical characters, rather than as bytes.
11.50.xC4	CHECKALLDOMAINSFORUSER	Configures how Informix searches for user names in a networked Windows environment. Not in the `onconfig.std` file.
11.50.xC2	LIMITNUMSESSIONS	Defines the maximum number of sessions that you want connected to Informix. If you specify a maximum number, you can also specify whether you want Informix to print messages to the **online.log** file when the number of sessions approaches the maximum number.
11.50	FAILOVER_CALLBACK	Specifies the full path name of a script that the database server executes when the server transitions from a secondary server to a primary or standard server.
11.50	HA_ALIAS	When a secondary server connects to a primary server, specifies the name of a network alias to use if a failover occurs.
11.50	MSG_DATE	When enabled, adds a date to the front of each message in the online log.
11.50	SHMNOACCESS	Specifies a virtual memory address range to not use to attach shared memory.
11.50	SSL_KEYSTORE_FILE	On clients, specifies the fully qualified file name of the keystore that stores the certificates of all servers to which the client connects. Not in the `onconfig.std` file.
11.50	SSL_KEYSTORE LABEL	On Informix, specifies the label of the server digital certificate used in the keystore database that stores Secure Sockets Layer (SSL) keys and digital certificates.

Table 17-8. New configuration parameters added in Version 11.50 (continued)

Version	New Configuration Parameter	Description
11.50	SSL_KEYSTORE_STH	On clients, specifies the fully qualified file name of the stash file that contains the encrypted keystore password. Not in the `onconfig.std` file.
11.50	STORAGE_FULL_ALARM	Configures the frequency and severity of messages and alarms when storage spaces become full.
11.50	UPDATABLE_SECONDARY	Enables client applications to perform update, insert, and delete operations on a high-availability secondary server.

Configuration parameters added to the onconfig.std file

The following table lists the existing configuration parameters that were added to the **onconfig.std** file in Version 11.50.

Table 17-9. Configuration parameters added to the onconfig.std file

Configuration Parameter	Value
ADMIN_USER_MODE_WITH_DBSA	none
BTSCANNER	num=1,priority=low,threshold=5000, rangesize=1,alice=6,compression=default
BACKUP_FILTER	none
BAR_DEBUG	0
CDR_SUPPRESS_ATSRISWARN	none
DD_HASHMAX	10
DD_HASHSIZE	31
DEF_TABLE_LOCKMODE	page
DS_HASHSIZE	31
DS_POOLSIZE	127
ENCRYPT_CDR	none
ENCRYPT_CIPHERS	none
ENCRYPT_HDR	none
ENCRYPT_MAC	none
ENCRYPT_MACFILE	none
ENCRYPT_SMX	none
ENCRYPT_SWITCH	none
EXT_DIRECTIVES	0
FASTPOLL	1
LOG_INDEX_BUILDS	none
MAX_INCOMPLETE_CONNECTIONS	1024
PC_HASHSIZE	31
PC_POOLSIZE	127
PLCY_HASHSIZE	127

Table 17-9. Configuration parameters added to the onconfig.std file (continued)

Configuration Parameter	Value
PLCY_POOLSIZE	31
PLOG_OVERFLOW_PATH	UNIX: $INFORMIXDIR/tmp Windows: none
RESTORE_FILTER	none
SBSPACETEMP	none
SDS_ENABLE	none
SDS_PAGING	none
SDS_TEMPDBS	none
SDS_TIMEOUT	20
SECURITY_LOCALCONNECTION	none
SQLTRACE	Commented out: # SQLTRACE level=low,ntraces=1000,size=2,mode=global
STMT_CACHE	0
STMT_CACHE_HITS	0
STMT_CACHE_NOLIMIT	0
STMT_CACHE_NUMPOOL	1
STMT_CACHE_SIZE	512
UNSECURE_ONSTAT	none
USRC_HASHSIZE	31
USRC_POOLSIZE	127
VPCLASS	cpu,num=1,noage Commented out: # VPCLASS aio,num=1 Commented out: #VPCLASS jvp,num=1

Configuration parameters that have new default values

The following table lists the configuration parameters that have new default values in the **onconfig.std** file.

Table 17-10. Configuration Parameters with New Default Values in the onconfig.std File

Configuration parameter	Previous value	New value
ADMIN_MODE_USERS	1	None
ALARMPROGRAM	UNIX: /usr/informix/etc/alarmprogram.sh Windows: None	UNIX: $INFORMIXDIR/etc/alarmprogram.sh Windows: $INFORMIXDIR\etc\alarmprogram.bat
BAR_ACT_LOG	/usr/informix/bar_act.log	UNIX: $INFORMIXDIR/tmp/bar_act.log Windows: $INFORMIXDIR\tmp\bar_act.log

Table 17-10. Configuration Parameters with New Default Values in the onconfig.std File (continued)

Configuration parameter	Previous value	New value
BAR_BSALIB_PATH	UNIX: $INFORMIXDIR/lib/libsad001.so Window: libbsa.dll	None
BAR_DEBUG_LOG	UNIX: /usr/informix/bar_dbug.log Windows: bar_dbug.log	UNIX: $INFORMIXDIR/tmp/bar_dbug.log Windows: $INFORMIXDIR\tmp\bar_dbug.log
BUFFERPOOL	Operating systems with 2K page size: • default,buffers=5000,lrus=8, lru_min_dirty=50, lru_max_dirty=60 • size=2k,buffers=5000,lrus=8, lru_min_dirty=50, lru_max_dirty=60 Operating systems with 4K page size: • default,buffers=1000,lrus=8, lru_min_dirty=50, lru_max_dirty=60 • size=4k,buffers=1000,lrus=8, lru_min_dirty=50, lru_max_dirty=60	Operating systems with 2K page size: • default,buffers=10000,lrus=8, lru_min_dirty=50.00, lru_max_dirty=60.50 • size=2k,buffers=50000,lrus=8, lru_min_dirty=50, lru_max_dirty=60 Operating systems with 4K page size: • default,buffers=10000,lrus=8, lru_min_dirty=50.00, lru_max_dirty=60.50 • size=4k,buffers=10000,lrus=8, lru_min_dirty=50, lru_max_dirty=60
CLEANERS	1	8
CONSOLE	UNIX: /dev/console Windows: console.log	UNIX: $INFORMIXDIR/tmp/online.con Windows: online.con
DB_LIBRARY_PATH	commented out: # DB_LIBRARY_PATH $INFORMIXDIR/extend	commented out: # DB_LIBRARY_PATH
DRLOSTFOUND	UNIX: /usr/etc/dr.lostfound Windows: \tmp	UNIX: $INFORMIXDIR/etc/dr.lostfound Windows: $INFORMIXDIR\tmp
DUMPDIR	UNIX: /usr/informix/tmp Windows: INFORMIXDIR\tmp	UNIX: $INFORMIXDIR/tmp Windows: $INFORMIXDIR\tmp
EXPLAIN_STAT	0	1
LISTEN_TIMEOUT	10	60
LOCKS	2000	20000
LOGBUFF	32	64
LOGSIZE	2000	10000

Table 17-10. Configuration Parameters with New Default Values in the onconfig.std File (continued)

Configuration parameter	Previous value	New value
LTAPEDEV	UNIX: /dev/tapedev Windows: \\.TAPE1	UNIX: /dev/tapedev (same as previous value) Windows: NUL
MIRRORPATH	None	UNIX: $INFORMIXDIR/tmp/demo_on.root_mirror Windows: none
MSGPATH	UNIX: /usr/informix/online.log Windows: online.log	UNIX: $INFORMIXDIR/tmp/online.log Windows: online.log
NETTYPE	UNIX: none Windows: onsoctcp,drsoctcp,1,NET	UNIX: ipcshm,1,50,CPU Windows: none
PHYSBUFF	32	128
PHYSFILE	2000	50000
RA_PAGES	None	64
RA_THRESHOLD	None	16
ROOTPATH	UNIX: /dev/online_root Windows: None	UNIX: $INFORMIXDIR/tmp/demo_on.rootdbs Windows: None
ROOTSIZE	30000	200000
SHMVIRT_ALLOCSEG	0	0,3
SHMVIRTSIZE	8192	32656
SYSALARMPROGRAM	UNIX: /usr/informix/etc/evidence.sh Windows: INFORMIXIDR\etc\evidence.bat	UNIX: $INFORMIXDIR/etc/evidence.sh Windows: Commented out: # SYSALARMPROGRAM $INFORMIXDIR\etc\evidence.bat
TAPEBLK	32	UNIX: 32 Windows: 16
TAPESIZE	10240	0

Configuration parameters that were changed

The following configuration parameters were changed in Version 11.50:

DIRECT_IO
Has new option for concurrent I/O on AIX operating systems.

DUMPSHMEM
Has new options for controlling how much memory is written to a dump file.

JVPJAVAHOME

/usr/informix in the directory name of the configuration parameter is replaced with **$INFORMIXDIR**.

The value is now: `$INFORMIXDIR/extend/krakatoa/jre`

JVPPROPFILE

/usr/informix" in the directory name of the configuration parameter is replaced with **$INFORMIXDIR**.

The value is now: `$INFORMIXDIR/extend/krakatoa/.jvpprops`

JVPLOGFILE

/usr/informixin the directory name of the configuration parameter is replaced with **$INFORMIXDIR**.

The value is now: `$INFORMIXDIR/jvp.log`

JVPCLASSPATH

/usr/informixin the directory name of the configuration parameter is replaced with **$INFORMIXDIR**.

The value is now: `$INFORMIXDIR/extend/krakatoa/krakatoa.jar:$INFORMIXDIR/extend/krakatoa/jdbc.jar`

Related reference:

"Deprecated and discontinued configuration parameters" on page 17-1

Configuration parameter changes in Versions 11.10, 10.00, and earlier

Some configuration parameters were added, some were changed, and some were removed in Version 11.10, Version 10.00, and earlier versions of the Informix server.

Table 17-11. New configuration parameters in Informix versions 11.10, 10.00, and 9.40

Version	New Configuration Parameter	Description
11.10	ADMIN_MODE_USERS	Enables user **informix** or a DBSA to give one or more specific users the ability to connect to the database server in administration mode through the **onmode -j** command, the **oninit -U** command, or the ADMIN_MODE_USERS configuration parameter.
11.10	ADMIN_USER_MODE_ WITH_DBSA	Specifies whether user **informix** and the DBSA group users can connect to the database server while it is in administration mode.
11.10	AUTO_AIOVPS	Enables or disables the ability of the database server to automatically increase the number of AIO VPs and flusher threads when the server detects that AIO VPs are not keeping up with the I/O workload.
11.10	AUTO_CKPTS	Enables or disables automatic checkpoints when the database server starts.
11.10	AUTO_LRU_TUNING	Enables or disables automatic LRU tuning when the database server starts.

Table 17-11. New configuration parameters in Informix versions 11.10, 10.00, and 9.40 (continued)

Version	New Configuration Parameter	Description
11.10	AUTO_REPREPARE	Controls whether Informix automatically re-optimizes SPL routines and re-prepares prepared objects after the schema of a table referenced by the SPL routine or by the prepared object was significantly changed.
11.10	BACKUP_FILTER	Specifies the path name of a backup filter program and any options that ON–Bar uses.
11.10	BAR_PERFORMANCE	Controls the level of information in the ON-Bar Activity log.
11.10	DIRECT_IO	Controls the use of direct I/O for cooked files used for database space chunks.
11.10	DRDA_COMMBUFFSIZE	Sets the buffer size of the DRDA communications buffer.
11.10	ENCRYPT_HDR	Enables or disables high-availability server encryption.
11.10	ENCRYPT_SMX	Sets the level of encryption for high-availability secondary server configurations.
11.10	EXPLAIN_STAT	Enables or disables the inclusion of a Query Statistics section in the **explain.out** file that the SET EXPLAIN statement of SQL or the **onmode -Y** ***session_id*** command can display.
11.10	LOG_INDEX_BUILDS	Enables or disables index page logging Index page logging is required when using RS secondary servers.
11.10	MAX_FILL_DATA_PAGES	Enables the database server to insert more rows per page into tables with variable-length rows.
11.10	PLCY_HASHSIZE	Specifies the number of hash buckets in the cache that holds information about label-based access control (LBAC) credentials for users
11.10	PLCY_POOLSIZE	Specifies the maximum number of entries in each hash bucket of the security policy information cache.
11.10	RESTORE_FILTER	Specifies the path name of a restore filter program and any options that ON–Bar uses.
11.10	RTO_SERVER_RESTART	Sets the amount of time, in seconds, that Informix has to recover from a problem after you restart the server and bring it into online or quiescent mode.
11.10	SDS_ENABLE,	Enables the shared-disk (SD) secondary server function.
11.10	SDS_PAGING	Specifies the location of two files that act as buffer-paging files.

Table 17-11. New configuration parameters in Informix versions 11.10, 10.00, and 9.40 (continued)

Version	New Configuration Parameter	Description
11.10	SDS_TEMPDBS	Specifies information that the SD secondary server uses to dynamically create temporary dbspaces when the SD secondary server starts.
11.10	SDS_TIMEOUT	Specifies the amount of time in seconds that the primary server waits for the SD secondary server to send a log-position acknowledgment.
11.10	SHMVIRT_ALLOCSEG	Specifies a threshold at which Informix allocates server memory, and specifies the alarm level activated if the server cannot allocate the new memory segment.
11.10	SQLTRACE	Controls the default behavior, such as the number of SQL statements to trace and the tracing mode, of the Query Drill-Down feature.
11.10	USELASTCOMMITTED	Specifies whether the database server uses the last committed version of the data when a lock occurs.
11.10	USRC_HASHSIZE	Specifies the number of hash buckets in the cache that holds information about LBAC credentials for users.
11.10	USRC_POOLSIZE	Specifies the maximum number of entries in each hash bucket of the cache that holds information about LBAC credentials for users.
11.10	TEMPTAB_NOLOG	Disables logging on temporary tables.
10.00.xC6	VP_MEMORY_CACHE_KB	Enables a private memory cache that is associated with a CPU virtual processor and contains blocks of free memory.
10.00.xC5	BAR_IXBAR_PATH	Specifies the path and name of the **ixbar**, the ON-Bar boot file.
10.00.xC5	FASTPOLL	Enables fast polling of your network, if your operating-system platform supports fast polling.
10.00.xC5	IFX_FOLDVIEW	Enables views to be folded into a parent query.
10.00.xC4	DB_LIBRARY_PATH	Specifies a comma-separated list of valid directory prefix locations from which the database server can load external modules.
10.00.xC4	SECURITY_ LOCALCONNECTION	Lets you verify security on local connections by verifying that the ID of the local user who is running a program is the same ID of the user who is trying to access the database.
10.0	ALRM_ALL_EVENTS	Specifies whether ALARMPROGRAM runs for all events that are logged in the MSGPATH or only specified noteworthy events.

Table 17-11. New configuration parameters in Informix versions 11.10, 10.00, and 9.40 (continued)

Version	New Configuration Parameter	Description
10.0	BUFFERPOOL	Specifies configuration information for a buffer pool for each different page size used by a dbspace.
10.0	CDR_SUPPRESS_ ATSRISWARN	Enterprise Replication configuration parameter that specifies whether comma-separated error and warning numbers are suppressed from ATS and RIS files.
10.0	DRIDXAUTO	Determines how a secondary database server reacts to a high-availability data-replication failure.
10.0	DS_NONPDQ_QUERY_MEM	Increases the amount of sort memory that is available for a query that is not a PDQ query.
10.0	EXT_DIRECTIVES	An external optimizer directive that provides a temporary solution to problems when you do not want to change SQL statements in queries
10.0	IFX_EXTEND_ROLE	Enables a database server administrator (DBSA) to prevent unauthorized users from registering DataBlade modules or external user-defined routines (UDRs).
10.0	LISTEN_TIMEOUT	Sets the incomplete connection timeout period.
10.0	MAX_INCOMPLETE_ CONNECTIONS	Restricts the number of incomplete requests for connections.
10.0	ONLIDX_MAXMEM	Limits the amount of memory that is allocated to the *preimage* log pool and to the *updator* log pool in shared memory. You can use this configuration parameter if you plan to complete other operations on a table column while executing the CREATE INDEX ONLINE statement on the column.
10.0	TBLTBLFIRST	Specifies the first extent size of tablespace **tblspace** in kilobytes.
10.0	TBLTBLNEXT	Specifies the next extent size of tablespace **tblspace** in kilobytes.
9.40	CDR_DBSPACE	Defines the default dbspace for the Enterprise Replication **syscdr** database.
9.40	CDR_ENV	Sets Enterprise Replication environment variables CDR_LOGDELTA, CDR_PERFLOG, CDR_ROUTER, and CDR_RMSCALEFACT.
9.40	CDR_MAX_ DYNAMIC_LOGS	Specifies the number of dynamic log file requests that Enterprise Replication can make in one server session.
9.40	ENCRYPT_CDR	Enables and sets the level of network encryption for Enterprise Replication.
9.40	ENCRYPT_CIPHERS	Specifies the ciphers to use for encryption for Enterprise Replication.

Table 17-11. New configuration parameters in Informix versions 11.10, 10.00, and 9.40 (continued)

Version	New Configuration Parameter	Description
9.40	ENCRYPT_MAC	Specifies the level of message authentication coding to use for Enterprise Replication.
9.40	ENCRYPT_MACFILE	Specifies MAC key files for Enterprise Replication.
9.40	ENCRYPT_SWITCH	Defines the frequency at which ciphers and secret keys are re-negotiated for Enterprise Replication.
9.40	HPL_DYNAMIC_LIB_ PATH	For the High-Performance Loader, sets the location of the shared-library file containing custom-code functions. Located in the **plconfig** file.
9.40	HPLAPIVERSION	For the High-Performance Loader, sets whether custom-code functions can use different input and output data lengths. Located in the **plconfig** file.
9.40	PLOG_OVERFLOW_PATH	Sets the location of the temporary space to extend the physical log during fast recovery.

Table 17-12. Configuration parameters that were changed or removed in version 11.10 and 10.0

Version	Changed or Removed Configuration Parameter	Description of Change
11.10	FAST_RESTART_CKPT_FUZZYLOG	Removed. The RTO_SERVER_RESTART configuration parameter eliminates fuzzy checkpoints, using interval checkpoints instead.
11.10	FAST_RESTART_PHYSLOG	Removed.
11.10	NOFUZZYCKPT	Removed. The RTO_SERVER_RESTART configuration parameter eliminates fuzzy checkpoints, using interval checkpoints instead.
10.00.xC6	SINGLE_USER_MODE_ WITH_DBSA (renamed to ADMIN_USER_MODE_ WITH_DBSA in Version 11.10)	Renamed. In Version 11.10, the name of this configuration parameter changed to ADMIN_USER_MODE_WITH_DBSA.
10.0	BUFFERS	Removed. Information now specified with the BUFFERPOOL configuration parameter.
10.0	LRUS	Removed. Information now specified with the BUFFERPOOL configuration parameter.
10.0	LRU_MAX_ DIRTY	Removed. Information now specified with the BUFFERPOOL configuration parameter.
10.0	LRU_MIN_ DIRTY	Removed. Information now specified with the BUFFERPOOL configuration parameter.

Related reference:
"Deprecated and discontinued configuration parameters" on page 17-1

Chapter 18. SQL keyword changes by version

Each version of Informix supports new SQL keywords that might affect the migration of your applications, if an application declares the same string as the identifier of a database object.

Although you can use almost any word as an SQL identifier, syntax ambiguities might produce errors or unexpected results in some contexts if you declare an SQL keyword as an identifier. If your applications use keywords as identifiers, you might consider renaming those identifier. Alternatively, you can enable the DELIMIDENT environment variable, enclose string literal values between single (') quotation marks, and enclose SQL identifiers values between double (") quotation marks.

The following table shows a list of new keywords of SQL in Informix. For a list of all keywords, see Keywords of SQL for IBM Informix in the *IBM Informix Guide to SQL: Syntax*. For details about a keyword, search for the keyword in the *IBM Informix Guide to SQL: Syntax*.

Table 18-1. New keywords of SQL

Informix Version	Keywords
Version 12.10.xC6	IFX_SOC_KEEPALIVE
Version 12.10.xC5	BSON_GET BSON_SIZE BSON_UPDATE BSON_VALUE_BIGINT BSON_VALUE_BOOLEAN BSON_VALUE_DATE BSON_VALUE_DOUBLE BSON_VALUE_INT BSON_VALUE_LVARCHAR BSON_VALUE_OBJECTID BSON_VALUE_TIMESTAMP BSON_VALUE_VARCHAR
Version 12.10.xC4	IFX_SESSION_LIMIT_LOCKS IFX_PUA_DISPLAY_MAPPING
Version 12.10.xC2	BSON JSON LATERAL

Table 18-1. New keywords of SQL (continued)

Informix Version	Keywords
Version 12.10.xC1	ACOSH ASINH ATANH CHR CLUSTER_TXN_SCOPE COMPRESSED CUME_DIST DEFAULTESCCHAR DENSERANK DENSE_RANK DISCARD FIRST_VALUE FOLLOWING EXCEPT G GB GIB GRID GRID_NODE_SKIP INTERSECT K KB KIB LAG LAST_VALUE LEAD M MB MIB MINUS NTILE NULLS PERCENT_RANK PRECEDING RANK RATIOTOREPORT RATIO_TO_REPORT ROLLING ROWNUMBER ROW_NUMBER SELECT_GRID SELECT_GRID_ALL SYS T TB TIB UNBOUNDED
Version 11.70.xC6	CLUSTER_TXN_SCOPE
Version 11.70.xC5	IFX_BATCHEDREAD_INDEX
Version 11.70.xC4	USTLOW_SAMPLE
Version 11.70.xC3	AUTO_READAHEAD

Table 18-1. New keywords of SQL (continued)

Informix Version	Keywords
Version 11.70.xC2	AAO ACCOUNT BARGROUP DBSA DBSSO INSENSITIVE NLSCASE SENSITIVE
Version 11.70.xC1	ADDRESS ATTRIBUTES AUTHENTICATION AUTHID AUTO_STAT_MODE AVOID_FACT AVOID_MULTI_INDEX AVOID_STAR_JOIN BASED BOUND_IMPL_PDQ BUCKETS CONTEXT DEBUG_ENV ENABLE ERKEY FACT FORCED HASH HOME IMPLICIT_PDQ INDEX_ALL MULTI_INDEX NON_DIM NUMTODSINTERVAL NUMTOYMINTERVAL PROPERTIES STAR_JOIN STATCHANGE STATLEVEL STORE TO_DSINTERVAL TO_YMINTERVAL TRANSITION TRUSTED UID UPON USE

Table 18-1. New keywords of SQL (continued)

Informix Version	Keywords
Version 11.50.xC6	BLOBDIR CLOBDIR DATAFILES DELIMITED DELUXE DISK EXPRESS FIXED FORMAT FORCE_DDL_EXEC IFX_BATCHEDREAD_TABLE INFORMIX MAXERRORS NUMROWS RECORDEND REJECTFILE RETAINUPDATELOCKS SAMEAS
Version 11.50.xC5	CONNECT_BY_ISCYCLE CONNECT_BY_ISLEAF CONNECT_BY_ROOT MERGE MATCHED SIBLINGS SYS_CONNECT_BY_PATH
Version 11.50.xC2	HDR
Version 11.50	BIGINT BIGSERIAL EXTDIRECTIVES PREPARE VERCOLS

Table 18-1. New keywords of SQL (continued)

Informix Version	Keywords
Version 11.10	ADMIN AVOID_INDEX_SJ FINAL IDSSECURITYLABEL INDEX_SJ INSERTING REFERENCES SAMPLING SELECTING STATEMENT SYSDBCLOSE SYSDBOPEN TASK UPDATING USELASTCOMMITTED WITH In addition, the DBSECADM role is reserved for LBAC administrative work. Version 11.10 contains a new database, the **sysadmin** database. If your source database server contains a database named **sysadmin**, you must rename it.
Version 10.0	ACTIVE CURRENT_ROLE DEFAULT_ROLE DIRECTIVES ENCRYPTION HINT IGNORE INACTIVE INITCAP INLINE INOUT LIMIT LOAD ONLINE OPTCOMPIND PARTITION PASSWORD REUSE SAVE SKIP STORAGE TEMPLATE TEST TRUNCATE TYPEID TYPENAME TYPEOF UNLOAD XADATASOURCE XID

Related information:
Keywords of SQL for Informix

Chapter 19. System catalog and system database changes by version

Each version of Informix contains system catalog table changes and **sysmaster** database changes.

Changes for version 12.10

Version 12.10 contains new and changed system catalog tables.

A new table was added to the system catalog:

- **syscdrtsapply**, which lists statistics about the time series elements that are applied on target servers.

Version 12.10 includes IBM Informix Primary Storage Manager catalog tables. These catalog tables contain information about the pools, devices, and objects that are managed by the storage manager.

The **sysopclstr** table is deprecated because the Informix Optical Subsystem feature was deprecated in 11.70.xC4.

As of 12.10.xC3:

- The **sysautolocate** system catalog table indicates which dbspaces are available for automatic table fragmentation.

As of 12.10.xC4:

- The **sysadmin** database contains a new table named **tenant**, which contains information about the tenant databases in a multitenancy environment.
- The **sysindices** system catalog table contains two new columns: **indexattr** and **jparam**.

Changes for version 11.70

Version 11.70 contains new **sysadmin**, **sysuser**, and system catalog tables. Version 11.70 also contains some system catalog table changes.

The system catalog now contains the following table:

- **sysfragdist**

The **sysadmin** database contains the following new table:

- **storagepool**

The **sysuser** database contains the following new tables:

- **sysintauthusers**
- **syssurrogategroups**
- **syssurrogates**
- **systcxattributes**
- **systcxusers**
- **systrustedcontext**

- **sysusermap**

The **sysprocedures** table contains a new column, **procflags**.

The **sysfragdist**, **sysdistrib**, **sysfragments**, and **sysindices** tables contain new columns with information about new features, such as changes to data distribution statistics and fragmentation strategies.

The **sysaudit** table also contains six new columns: **succ6**, **succ7**, **succ8**, **fail6**, **fail7**, and **fail8**

The **sysams** system catalog table has a new column, **am_expr_pushdown**.

The **am_param** column in the **systabamdata** table is now an LVARCHAR(8192) data type.

The **sysopclstr** table is deprecated because the Informix Optical Subsystem feature was deprecated in 11.70.xC4.

Changes for version 11.50

Version 11.50 contains two new **sysmaster** database tables and new SMI tables.

The version 11.50.xC6 **sysmaster** database contains the following new tables:

- SYSEXTERNAL
- SYSEXTCOLS
- SYSEXTDFILES

The version 11.50.xC4 **sysmaster** database contains the new **syscompdicts_full** table and the new **syscompdicts** view.

The version 11.50.xC3 **sysmaster** database contains the new **syscdc** table for the Change Data Capture API.

The version 11.50 **sysmaster** database contains the new **syssesappinfo** table.

The following new SMI tables contain information about Enterprise Replication that you can use to monitor status and diagnose problems:

- The **syscdr_state** table contains information about whether Enterprise Replication, data capture, data apply, and the network between servers is active.
- The **syscdr_ddr** table contains information about the status of log capture and the proximity or status of transaction blocking (DDRBLOCK) or transaction spooling.
- The **syscdr_nif** table contains information about network connections and the flow of data between Enterprise Replication servers.
- The **syscdr_rcv** table contains information about transactions being applied on target servers and acknowledgments being sent from target servers.
- The **syscdr_atsdir** table contains information about the contents of the ATS directory.
- The **syscdr_risdir** table contains information about the contents of the RIS directory.
- The **syscdr_ats** table contains the first ten lines of content of each ATS file.
- The **syscdr_ris** table contains the first ten lines of content of each RIS file.

- The **syscdr_rqmstamp** table contains information about which transaction is being added into each queue.
- The **syscdr_rqmhandle** table contains information about which transaction is being processed in each queue.

Changes for version 11.10

Version 11.10 contains new **sysmaster** database tables and the new **sysadmin** database.

The version 11.10 **sysmaster** database contains these new tables:

syscheckpoint

sysckptinfo

Schema changes were made to the **systables**, **sysindices**, and **sysfragments** tables for Version 11.10. For information about the current schema, see information on **systables**, **sysindices**, and **sysfragments** in the *IBM Informix Guide to SQL: Reference*.

Version 11.10 also includes a new database, **sysadmin**, which contains tables that store task properties. This database is dropped when you revert to earlier versions of the database server. If your source database server contains a **sysadmin** database, you must rename it.

Changes for version 10.00

Version 10.00 contains new **sysmaster** database tables and new SMI tables.

The version 10.00 **sysmaster** database contains these new tables:

sysdirectives sysbufpool, a system-monitoring interface (SMI)

The following changes were made to other SMI tables:

- The **sysfragments** table contains a **Partition** column and the **Flags** column now tells you if the fragmentation scheme has partitions.
- The **sysusers** table contains a **defrole** column.
- The **sysams** table contains an **am_truncate** column.
- The **sysprocedures** table contains a **rtnparameters** column for information about INOUT parameters.
- The **syspaghdr** table has a **pg_pagesize** column.
- The **sysptnhdr** table has a **pagesize** column.
- The **sysptnhdr** table has a **bpoolindx** column that indicates which buffer pool the buffer is in.
- The **sysbufhdr** table has a **bufsize** column, which indicates the buffer page size.
- The **sysdbstab** and **syschktab** tables have **pagesize** columns.
- The views **syschunks** and **sysdbspaces** tables have a **pagesize** columns.
- The views **systabinfo** table has a **ti_pagesize** column.
- The views **systabpaghdrs** and **sysphyspaghdrs** tables have **pg_pagesize** columns.

In addition, tables added to the **sysscdr** database are removed.

Chapter 20. Server library name changes by version

Each version of the database server contains some new server library names.

The following database server library names have new names. These library files have a `.so` or `.dll` extension.

Library	Name for 10.0 Server	Name for 11.10, 11.50, or 11.70 Server	Name for 12.10 Server
pload	ipldd10a	ipldd11a	ipldd12a
Simple password CSM	ispws10a	ispws11a	ispws12a
Encryption CSM	iencs10a	iencs11a	iencs12a

Part 6. Appendixes

Appendix. Accessibility

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

Accessibility features for IBM Informix products

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

Accessibility features

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

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

Keyboard navigation

This product uses standard Microsoft Windows navigation keys.

Related accessibility information

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

IBM and accessibility

For more information about the IBM commitment to accessibility, see the *IBM Accessibility Center* at http://www.ibm.com/able.

Dotted decimal syntax diagrams

The syntax diagrams in our publications are available in dotted decimal format, which is an accessible format that is available only if you are 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), the elements 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 punctuation. All syntax elements that have the same dotted decimal number (for example, all syntax elements that have the number 3.1) are mutually exclusive alternatives. If you hear the lines 3.1 USERID and 3.1 SYSTEMID, 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, the word or symbol 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 read as 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 that provides 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, that element is defined elsewhere. The string that follows the % symbol is the name of a syntax fragment rather than a literal. For example, the line 2.1 %OP1 refers to a separate syntax fragment OP1.

The following words and symbols are used next to the dotted decimal numbers:

? Specifies 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.

! Specifies 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 is 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.

***** Specifies a syntax element that can be repeated zero 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 more than one data area or you can include none. 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 can write `HOST STATE`, but you cannot write `HOST HOST`.
3. The `*` symbol is equivalent to a loop-back line in a railroad syntax diagram.

`+` Specifies 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. 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. As for the * symbol, you can 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.

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