



IBM Informix Dynamic Server

New Features in IDS 11.50.xC6

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INTRODUCTION

The development of Informix Dynamic Server continues with a host of new features added to the 11.50.FC6 version. These features cover a range of areas, further strengthening IDS's position by improving on Availability, Performance & Administration.



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NEW FEATURES

Using an RSS Server to Take a Backup

It is now possible to make an archive of an instance from an RSS server. This will help reduce the I/O load on the primary server. The backup is no different to one made on the primary and can be restored to any node within the cluster.

This feature is documented in the *IBM Informix Dynamic Server Administrator's Reference*, the *IBM Informix Backup and Restore Guide*, and the *IBM Informix Dynamic Server Administrator's Guide*.

Transaction Rollback Estimates

When you monitor a transaction using **onstat -x** you will see an estimate for the expected time that the rollback will require to complete.

```
IBM Informix Dynamic Server Version 11.50.FC6 -- On-Line -- Up 21:11:43 -- 394784 Kbytes
Transactions
```

address	flags	userthread	locks	begin_logpos	current logpos	isol	est. rb_time	retrys
558e4028	A----	558a1028	0	-	-	COMMIT	-	0
558e4340	A----	558a1878	0	-	-	COMMIT	-	0
558e4658	A----	558a20c8	0	-	-	COMMIT	-	0
558e4970	A----	558a2918	0	-	-	COMMIT	-	0
558e6860	A----	558a73e8	0	-	-	COMMIT	-	0
558e6e90	A-B--	558a8cd8	411395	553:0x205018	556:0x8504bc	COMMIT	0:10	0

As the transaction progresses normally, the estimated time will increase. If it has to rollback then the time will progressively decrease, as will the current log position.

The **onstat -x** command is documented in the *IBM Informix Dynamic Server Administrator's Reference*.

Dynamic Listener Threads

You can now dynamically start, stop, or restart an existing listener thread for a SOCTCP or TLITCP network protocol without interrupting existing connections. Use the new **onmode -P** commands or the new SQL administration API **admin()** or **task()** functions.

For example, once the correct information has been added to the sqlhosts file, a new listener thread can be added from the command line with **onmode -P start new_ixol**. You will see a confirmation message in the log file.

```
15:29:12 Starting listen thread for sqlhosts server new_ixol
15:29:12 Listen thread init SUCCESS
```



Or, using the SQL API to stop the thread:

```
EXECUTE FUNCTION task ('stop listen', 'new_ixol');
```

There is also a corresponding closing message in the log.

```
16:09:13 Stopping listen thread for sqlhosts server new_ixol  
16:09:14 Listen thread shutdown SUCCESS
```

This information is documented in the *IBM Informix Dynamic Server Administrator's Reference* and the *IBM Informix Dynamic Server Administrator's Reference*.

SQL Administration API Portal

You can view **admin()** and **task()** function arguments, listed by category, and follow the links to information about the arguments. These are the possible categories.

- Compression Arguments
- Configuration Parameter Arguments
- Data, Partition, and Extent Arguments
- Enterprise Replication Arguments
- High Availability Arguments
- Listen Thread Arguments
- Log Arguments
- Memory Arguments
- Mirror Arguments
- Parallel Database Query (PDQ) Arguments
- Server Mode Arguments
- Space Arguments
- Miscellaneous Arguments
- SQL Tracing Arguments

This information is documented in the *IBM Informix Dynamic Server Administrator's Reference*.

Connection Manager Proxy Support

The Connection Manager can now be configured as a proxy server when clients connect to Informix data servers from outside a firewall. You can use proxy names when you configure high-availability cluster connections using the Connection Manager.

A new **oncmsm** configuration variable has been added, called MODE. You can specify either REDIRECT or PROXY mode for each SLA. You can configure the Connection

Manager to use both REDIRECT and PROXY mode SLAs at the same time.

In the default REDIRECT mode the Connection Manager will notify the client of the appropriate server details, the client will connect directly to that server and the Connection Manager plays no further part in the process.

In PROXY mode the client stays connected to the Connection Manager which then relays all the client traffic to the server. For performance reasons it is recommended to have multiple Connection Managers when operating in PROXY mode.

The Connection Manager is installed along with the Client SDK and is documented in the *IBM Informix Dynamic Server Administrator's Reference* and the *IBM Informix Dynamic Server Administrator's Guide*.

Viewing Event Alarms

Event alarms get stored in the **ph_alert** table in the **sysadmin** database. There is also a view called **ph_alerts** which includes additional text that describes the task. You can query the **ph_alert** table or **ph_alerts** view on a local or remote server to see the recent event alarms for that server.

```
> SELECT * FROM ph_alerts WHERE alert_object_type = 'ALARM';

alert_id          59
run_id            83
task_id           15
task_name         post_alarm_message
task_description  System function to post alerts
alert_type        WARNING
alert_color       YELLOW
alert_time        2010-01-12 01:00:56
alert_state       NEW
alert_object_type ALARM
alert_object_name 44
alert_message     WARNING: DBspace rootdbs is full
alert_action_dbs  sysadmin
alert_action
```

This feature is documented in the *IBM Informix Dynamic Server Administrator's Reference*.

Basic Text Search Enhancement

The Basic Text Search feature was previously restricted to only 1 VP for query processing. This would become a bottleneck in a system where many concurrent sessions were using Basic Text Search. The 11.50.xC6 release removes this restriction, allowing multiple

concurrent sessions to use the text search feature. To increase permanently the number of available BTS VPs, you should add a VPCLASS value to the \$ONCONFIG file.

```
VPCLASS bts,num=2,noyield
```

This can also be done dynamically on the command line using **onmode -p +1 bts** to add 1 more VP.

The BTS feature is documented in the *IBM Informix Database Extensions User's Guide*.

MERGE Statement Enhancements

DELETE Clause

The MERGE statement was introduced in IDS 11.50.xC5 and allowed for an INSERT or UPDATE command to be specified in the MATCHED/NOT MATCHED clause. The MERGE statement now also supports the use of DELETE as a command in the same circumstance.

```
MERGE INTO contacts
USING validated AS v
ON contacts.cust_id = v.cust_id
WHEN NOT MATCHED THEN DELETE
WHEN MATCHED THEN UPDATE
    SET (cust_id, email, contact_date) =
        (v.cust_id, v.email, TODAY);
```

In the above example the current customer contacts list is merged with a newly validated list. Where the customer contact has not been validated then it is deleted, otherwise the record is updated.

No order restriction on MATCHED/NOT MATCHED clause

When the MERGE statement was introduced the MATCHED clause had to come before NOT MATCHED. As can be seen from the above example, this restriction has been removed.

More table types and join methods supported

There are now fewer limits on the type of join and the tables that may be used in the ON clause of the MERGE statement. So you can specify a more selective join predicate because you no longer need to include an equality condition. You can use an external table, created by the CREATE EXTERNAL TABLE statement, as a source table in the MERGE statement. Also, you can use a table protected by LBAC as a source or target table in a MERGE statement. In addition, you can include savepoints in a transaction to



preserve the effects of the MERGE statement after a partial rollback.

The MERGE statement is documented in the *IBM Informix Guide to SQL: Syntax* and the *IBM Informix Guide to SQL: Tutorial*.

Attach/Detach – Automatic Transaction Rollback

The ALTER FRAGMENT operation requires exclusive access and exclusive locks on all the tables involved in the operation. Now a DBA can force out other transactions that opened or locked the tables involved in an ALTER FRAGMENT ON TABLE operation. When the FORCE_DDL_EXEC environment option is enabled, the ALTER FRAGMENT ON TABLE operation waits to get exclusive access to the table, as specified by the lock mode wait value. If necessary, the server rolls back the transactions that have access or locks on the tables involved in the operation until the timeout value of the FORCE_DDL_EXEC environment option is reached.

A client may have performed a simple transaction which puts a lock on the table.

```
> BEGIN;
Started transaction.
> INSERT INTO batch_post_id VALUES (0, CURRENT, 'Week End');
1 row(s) inserted.
```

And this prevents any DDL statements from being executed, unless overridden by the new environment variable.

```
> ALTER FRAGMENT ON TABLE batch_post_id INIT
> FRAGMENT BY ROUND ROBIN IN dbs1, dbs2;
242: Could not open database table (cosmo.batch_post_id).
113: ISAM error: the file is locked.
Error in line 1
Near character position 78
> SET ENVIRONMENT FORCE_DDL_EXEC '10';
Environment set.
> ALTER FRAGMENT ON TABLE batch_post_id INIT
> FRAGMENT BY ROUND ROBIN IN dbs1, dbs2;
Alter fragment completed.
```



On the client side, the transaction acting on the table that was holding up the initial request receives a transaction aborted message.

```
> COMMIT;  
458: Long transaction aborted.  
12204: RSAM error: Long transaction detected.
```

This feature is documented in the *IBM Informix Guide to SQL: Syntax*.

Setting **RETAINUPDATELOCKS**

The **RETAINUPDATELOCKS** environment option can improve concurrency in Dynamic SQL applications that include the **SELECT . . . FOR UPDATE** statement. When your session uses the Committed Read, Dirty Read, or Cursor Stability isolation levels, you can set this option to instruct the database server to postpone releasing update locks until a transaction ends.

Retaining update locks prevents users in other sessions from locking rows that you have not yet updated. If you add this statement to the **sysdbopen()** routine the setting will persist for the duration of the current session.

For example, to have locks retained during the Committed Read isolation level, issue the following statement.

```
SET ENVIRONMENT RETAINUPDATELOCKS 'COMMITTED READ' ;
```

Now, whenever the isolation level is set to Committed Read the **RETAIN UPDATE LOCKS** clause will be implied.

The **RETAINUPDATELOCKS** feature is documented in the *IBM Informix Guide to SQL: Syntax*

Enable/Disable Enterprise Replication Event Alarms

You can control which Enterprise Replication event alarms are enabled by setting the **CDR_ALARMS** environment variable with the **CDR_ENV** configuration parameter. By default, most Enterprise Replication event alarms are enabled. The state change events 49, and 51 through 70, which indicate that a **cdr** command was run, are disabled by default.

This feature is documented in the *IBM Informix Dynamic Server Enterprise Replication Guide*.

XA Transactions on Secondary Servers

Client applications that connect to updatable secondaries in a high-availability cluster can

use XA transactions. Previously, only client applications connected to primary servers could use XA transactions. Initiating an XA transaction on a secondary server will redirect a proxy transaction to the primary. The redirected transaction has a flag code of M in position 5 on the **onstat -x** output.

This feature is documented in the *IBM Informix Dynamic Server Administrator's Reference* and the *IBM Informix Migration Guide*.

IDS Install on Linux using RPM

You can install IBM Informix products by using RPM Package Manager (RPM) on some Linux® operating systems (see the Machine Notes for the list of operating systems). RPM simplifies installation by installing the product from a single package, and tracks the packages that are installed on a system. By default, this method installs IDS in the `/opt/IBM/informix` directory but this can be changed by using the **--relocate** option to RPM.

This information is documented in the *IBM Informix Dynamic Server Installation Guide for UNIX, Linux, and Mac OS X*.

Deployment Utility

You can use the deployment utility **ifxdeploy** to rapidly deploy a configured IDS instance to multiple computers, avoiding the need to configure manually instances on each computer and wait for each instance to initialise. By setting configuration parameters, essential environment variables, and SQLHOST connectivity information in a deployment utility configuration template file **ifxdeploy.conf**, you can reuse the configuration file to deploy the instance multiple times. You can call the utility programmatically or from a script as part of an application installation that embeds IDS. The utility automatically extracts *tar* files that have been compressed with **gzip**.

This feature is documented in the *IBM Informix Dynamic Server Installation Guide for UNIX, Linux, and Mac OS X*

Dynamic dbspace Relocation when Deploying Snapshots

On the Windows platform, you can dynamically reconfigure the chunk paths of a snapshot by using the **-relocate** option of the deployment utility. The **-relocate** option initialises the dbspaces required for deploying the template instance without a separate step for disk space initialisation.

The feature is documented in the *IBM Informix Dynamic Server Installation Guide for Windows*.

Migrating or Upgrading MACH-11 Clusters

Information has been added to the *IBM Informix Migration Guide* to help you coordinate the migration of all servers in a high-availability cluster. If you use high-availability clusters, refer to this information when you upgrade to a new PID or fix pack, migrate to a new version of IDS, or revert to the previous version of IDS if necessary.

Quickly Reverting after a Failed Upgrade

If an upgrade to a new IDS version or fix pack fails, use the new **onrestorept** utility to restore the server to a consistent, pre-upgrade state. You can undo changes made during the upgrade in minutes (and in some cases, in seconds). Previously, if a fix pack upgrade failed, you had to restore the database by using a level-0 archive.

The new `CONVERSION_GUARD` and `RESTORE_POINT_DIR` configuration parameters specify information that the **onrestorept** utility can use if an upgrade fails. If the upgrade is successful then the savepoint information is deleted and **onmode -b** should be used if the server needs to be downgraded to a previous version.

Note that the `CONVERSION_GUARD` parameter must be set before the upgrade is attempted in order to be able to use the **onrestorept** utility.

The procedure for upgrading to a new IDS version or fix pack and the **onrestorept** utility are documented in the *IBM Informix Migration Guide* and the new configuration parameters are documented in the *IBM Informix Dynamic Server Administrator's Reference*.

Data Scan Enhancements

You can now enable IDS to perform light scans on compressed tables, tables with rows that are larger than a page, and tables with any variable length data, including VARCHAR, LVARCHAR, and NVARCHAR types. The server does not scan pieces of a row (such as smart large objects) that are stored outside of the row.

To enable light scans, set the `BATCHEDREAD_TABLE` configuration parameter to 1. You can also use the `IFX_BATCHEDREAD_TABLE` environment option of the `SET ENVIRONMENT` statement to change the value of the `BATCHEDREAD_TABLE` configuration parameter for a session.

To display scan information, use the new **onstat -g scn** command. This command supersedes the **onstat -g lsc** command.

```

RSAM batch sequential scan info
SesID Thread Partnum Rowid Rows Scan'd Scan Type Lock Mode Notes
26 65 500002 111c 924 Buffpool Slock+Test
26 66 600002 171c 1260 Buffpool Slock+Test
26 67 700002 141c 1092 Buffpool Slock+Test
26 68 800002 141c 1092 Buffpool Slock+Test

```

The above output is from a parallel query operating across a table with 4 fragments, showing that you can monitor the progress of each individual scan thread.

This feature is documented in the *IBM Informix Dynamic Server Administrator's Reference* and the *IBM Informix Performance Guide*.

External Tables

External Tables is a feature first developed for IBM Informix Extended Parallel Server (XPS) and it is now available in IDS. As the name implies it is a way of defining an IDS table but having the data stored outside the database. It provides an SQL interface to the file which means instead of the normal process of loading data from a file into a staging table and then manipulating the data and populating a live table it is possible to manipulate the data directly from the file without using a staging table. There are also performance benefits if the data is split into multiple files allowing many threads to process the data in parallel.

Creating and using a simple External Table

The syntax for creating an external table is similar to XPS but does not have the extra complexity of having to manage multiple co-server nodes. Because of these differences there are two separate sections in the IBM Informix Guide to SQL: Syntax to describe the statement.

There is a large number of options to control the behaviour of external tables, the following section has some examples of the more common ones.

```
CREATE EXTERNAL TABLE store_totals_in
(
    store_id      INTEGER,
    product_id    BIGINT,
    sales_date    DATE,
    number_sold   DECIMAL(10,2),
    total_value   DECIMAL(10,2)
)
USING
(
    DATAFILES ('DISK:/data/incoming/store_data.unl'),
    FORMAT 'DELIMITED',
    REJECTFILE '/data/errlog/store_data.rej',
    MAXERRORS 250,
    DELUXE
);
```

This is a simple definition that associates the table with a single file on disk. The DELIMITED format indicates that the columns in the file will be separated with a delimiter character. The default delimiter is '|', like a regular UNLOAD file, but this can be changed by using the DELIMITER keyword. Alternatively, FIXED format can be used with constant size row lengths. While processing the file, up to 250 formatting errors will be tolerated before an error is returned and the bad rows, along with the error condition, will be logged

to a file.

To make use of this External Table to load data into the system it is simply a case of issuing the SQL statement:

```
INSERT INTO store_totals SELECT * FROM store_totals_in;
```

The DELUXE keyword indicates that the table will be loaded using the standard SQL interface which means the inserts are logged and any indexes on the table are updated.

Improving performance

Here is another example, showing how the table schema can be specified based on an existing table and how multiple input data streams can be specified. Note also the use of a filter on the External Table, just as if it was a regular IDS table.

```
CREATE RAW TABLE product_sales
(
  store_id      INTEGER,
  product_id    BIGINT,
  sales_time    DATETIME YEAR TO SECOND,
  quantity      DECIMAL(8,2),
  price         DECIMAL(8,2)
) FRAGMENT BY ROUND ROBIN in dbs1, dbs2, dbs3, dbs4;

CREATE EXTERNAL TABLE product_sales_in
SAMEAS product_sales
USING
(
  DATAFILES
  (
    'PIPE:/data/incoming/sales_data_0.fifo',
    'PIPE:/data/incoming/sales_data_1.fifo',
    'PIPE:/data/incoming/sales_data_2.fifo',
    'PIPE:/data/incoming/sales_data_3.fifo'
  ),
  FORMAT 'DELIMITED',
  REJECTFILE '/data/errlog/sales_data.rej',
  MAXERRORS 1000,
  EXPRESS
);

INSERT INTO product_sales
SELECT * FROM product_sales_in WHERE quantity > 0;
```

The above example also shows the use of the PIPE device which allows data transfer without having to store data physically in the file system. The pipe should be created with the *mkfifo* or *mknod* command and the data then written to, or from, it by an O/S process. A new VPCCLASS of **fifo** is introduced to support this method of external data I/O.

The EXPRESS mode is for RAW tables where no logging is performed, indexes are not allowed and the new data is appended to the table without using space freed up by deleted rows. Using EXPRESS mode and multiple input streams will significantly increase the performance of external tables. Tests have shown speeds up to 3X that of the High Performance Loader.

You can monitor the progress of an EXPRESS mode insert by looking at the light append information using **onstat -g lap**.

```
Light Append Info
session id  address      cur_ppage  la_npused  la_ndata   la_nrows   bufcnt
145         57bf8aa8    95         96         95         5355       4
145         57bf8028    95         96         95         5355       4
145         57b15e38    138        259        258        14450      4
145         57b153b8    138        259        258        14450      4
```

Because there is no way to index the external data, the only mechanism for reading data from the table is by a sequential scan. This should be taken into consideration when using large External Tables. The keyword SIZE, or its synonym NUMROWS, can be used to indicate to the optimiser how big the External Table is when considering how to process a table join

Unloading data

A select on an External Table can be used in places where a regular SQL select statement can be specified. For example, as well as loading data into IDS, External Tables can be used to unload data by using an SQL INSERT statement, selecting data from a regular table and inserting it into the External Table.

It is also possible to unload the data and specify the External Table in a single SELECT statement:

```
SELECT product_id, SUM(quantity) volume, SUM(price) value
FROM product_sales
WHERE DATE(sales_time) = TODAY
GROUP BY product_id
INTO EXTERNAL product_sales_summary
USING
(
  FORMAT 'INFORMIX',
  DATAFILES ('DISK:/data/latest/sales_sum.dat')
);
```



This will create the file and unload the selected data to it. The INFORMIX format means the data will be directly unloaded in a binary format which is only suitable for loading or manipulating by IDS.

Restrictions on External Tables

Because the data is outside the control of IDS there are a number of restrictions on External Tables such as no indexes or constraints, no triggers, no logging or replication. Rows in External Tables cannot be updated or deleted and the table cannot have compression applied or use LBAC. An External Table can be used in a MERGE statement but only as the source table and only one External Table can appear in a multi-table SQL statement.

The full list of restrictions is detailed in the IBM Informix Guide to SQL: Syntax.

Enhancements to the OpenAdmin Tool

The latest release of OAT is Version 2.27 and it can be obtained from the OpenAdmin website: <http://www.openadmintool.org/>

Language Support

The OpenAdmin Tool is now available in multiple languages: Czech, Brazilian Portuguese, English, German, Hungarian, Italian, Japanese, Korean, Polish, Russian, Simplified Chinese, Slovak, Spanish, and Traditional Chinese.

Server Configuration

On the high availability clusters page (MACH), you can configure the Connection Manager for use as a proxy server [See P. 4 above for details on Connection Manager Proxy Support].

Schema Manager Plugin

The Schema Manager plugin has a new Version – 1.2 and includes the following features:

- You can create database tables and define the attributes necessary to make the tables fully functional.
- You can drop or truncate tables.
- You can load and unload data from a source outside the database server by using external tables. You can define an external table for loading and unloading data by creating an external table that has the same schema as the database table, or use a previous definition. [See P. 11 above for details of the new External Tables feature.]



Enhanced Enterprise Replication Plugin for OAT

The Enterprise Replication (ER) plugin Version 2.24 has the following enhancements:

- You can improve the performance of the consistency check and synchronisation tasks for replicates and replicate sets. You can limit the amount of data to check to the rows updated from a specified time. For replicates, you can also specify a subset of a table to check using a WHERE clause. For replicate sets, you can process the replicates in a replicate set in parallel.
- You can delete information about completed check and synchronisation tasks from the OAT display.
- You can delete ER objects including servers, replicates, replicate sets, and templates.
- You can instantiate an ER template on multiple servers at the same time. In previous releases, a template was instantiated on one server at a time.
- You can change the master replicate server for a replicate. In previous releases, the master replicate server could not be changed.
- The wizard for checking and synchronising replicate sets and replicates has been updated to improve usability.

See the respective plugin help sections in OpenAdmin Tool for more details.

INTEGRATED SOLUTIONS AND RELATED OFFERINGS

IDS as the Content Store for Cognos 8

Cognos 8 now supports IDS (Express Edition) as its content store through its latest fix pack. This endeavour is primarily focused on the Cognos mid-market offering and is available only on the Windows platform.

A Cognos-Informix Lightweight Installer (*lwt_install*) script is a deployment tool from IDS that allows a user to install and configure an Informix database as needed and redeploy it on another machine.

Cognos Express uses this command line utility to redeploy a preconfigured installation of Informix as an embedded content store. The script populates the tables and does other run-time tasks in the scope of content manager.

Installation:

```
lwt_install.exe [-f <zip_file>] [-p <password> | -system] [-l <logfile>]
  [-silent] [-wow6432] [-sqlipport <port>] [-drdaport <port>]
  [-namedpipe] [-servernum <num>] [-rootpath <rootdbs_file>]
  [-unzip <unzip_cmd>] [-installdrive <DRIVE> ]
  [-verbose] [-force] [-y]

-force           Overwrite existing settings.
-installdrive   Drive where the IFMXDATA directory will be created.
-namedpipe      Set the primary SQLI protocol to use named pipes.
-rootpath       Root dbspace location is <rootdbs_file>
                (default is C:\ifmxdata\<svr_name>\rootdbs_dat.000).
-silent         Silent mode (writes to log only).
-system         IDS service will logon as SYSTEM user.
-verbose        Verbose mode.
-wow6432        Use when installing 32-bit IDS on 64-bit Windows.
-y             Do not prompt for confirmation.
-drdaport       Specify DRDA port number (default is 9089).
-l             Send progress messages to a log file.
-p             Informix user password for creating IDS service.
-servernum      Specify onconfig SERVERNUM (default is 0).
-sqliport       Specify SQLI port number for the IDS instance
                (default is 9088).
-unzip          Use <unzip_cmd> as the unzip/untar command instead
                of '7z'.
-f             Specify zipped INFORMIXDIR file as <zip_file>.
```

To un-install:

```
lwt_install.exe [-u <path> | -uninstall <path>]
  -uninstall   Uninstall IDS from INFORMIXDIR environment variable.
```

REFERENCES

IDS Manuals

The following Informix IDS manuals were used in the preparation of this paper:

IBM Informix Dynamic Server Administrator's Reference

IBM Informix Dynamic Server Administrator's Guide

IBM Informix Guide to SQL: Syntax

IBM Informix Guide to SQL: Tutorial

IBM Informix Performance Guide

IBM Informix Backup and Restore Guide

IBM Informix Migration Guide

IBM Informix Database Extensions User's Guide

IBM Informix Dynamic Server Enterprise Replication Guide

IBM Informix Dynamic Server Installation Guide for UNIX, Linux, and Mac OS X

IBM Informix Dynamic Server Installation Guide for Windows

Online Resources

The full set of IDS manuals and machine specific release notes can be browsed online at the [IBM InfoCenter](#). Or they can be downloaded in PDF format either individually from the [Publications Library](#) or as a complete documentation set in [ZIP format](#).



IBM Informix Dynamic Server

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