

iWay

iWay Change Data Capture
Solution for Informix
Version 7.0.x and Higher

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Preface

This document describes how to install and configure the iWay Change Data Capture Solution for Informix. It is written for system integrators and application designers who need to provide integration between IBM Informix Dynamic Server (IDS) and RDBMS destinations.

Note: This Release 7.0.x content is currently being updated to support iWay Release 8.0.x software. In the meantime, it can serve as a reference for your use of iWay Release 8. If you have any questions, please contact Customer_Success@ibi.com.

How This Manual Is Organized

This manual includes the following chapters:

	Chapter/Appendix	Contents
1	Introducing the iWay Change Data Capture Solution for Informix	Provides an overview of the iWay Change Data Capture (CDC) Solution for Informix, including key features and facilities.
2	Installing and Configuring the iWay Change Data Capture Solution for Informix	Describes how to install and configure the iWay Change Data Capture (CDC) Solution for Informix.
3	Configuring iWay Change Data Capture Components	Describes how to configure iWay Change Data Capture (CDC) components.

Documentation Conventions

The following table describes the documentation conventions that are used in this manual.

Convention	Description
<code>THIS TYPEFACE</code> or <code>this typeface</code>	Denotes syntax that you must enter exactly as shown.
<i>this typeface</i>	Represents a placeholder (or variable), a cross-reference, or an important term. It may also indicate a button, menu item, or dialog box option that you can click or select.
<u>underscore</u>	Indicates a default setting.

Convention	Description
Key + Key	Indicates keys that you must press simultaneously.
{ }	Indicates two or three choices. Type one of them, not the braces.
	Separates mutually exclusive choices in syntax. Type one of them, not the symbol.
...	Indicates that you can enter a parameter multiple times. Type only the parameter, not the ellipsis (...).
.	Indicates that there are (or could be) intervening or additional commands.

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Help Us to Serve You Better

To help our consultants answer your questions effectively, be prepared to provide specifications and sample files and to answer questions about errors and problems.

The following tables list the environment information our consultants require.

Platform	
Operating System	
OS Version	
JVM Vendor	
JVM Version	

The following table lists the deployment information our consultants require.

Adapter Deployment	For example, iWay Business Services Provider, iWay Service Manager
Container	For example, WebSphere
Version	
Enterprise Information System (EIS) - if any	
EIS Release Level	
EIS Service Pack	
EIS Platform	

The following table lists iWay-related information needed by our consultants.

iWay Adapter	
iWay Release Level	
iWay Patch	

The following table lists additional questions to help us serve you better.

Request/Question	Error/Problem Details or Information
Did the problem arise through a service or event?	
Provide usage scenarios or summarize the application that produces the problem.	
When did the problem start?	
Can you reproduce this problem consistently?	
Describe the problem.	
Describe the steps to reproduce the problem.	
Specify the error message(s).	
Any change in the application environment: software configuration, EIS/database configuration, application, and so forth?	
Under what circumstance does the problem <i>not</i> occur?	

The following is a list of error or problem files that might be applicable.

- Input documents (XML instance, XML schema, non-XML documents)
- Transformation files
- Error screen shots
- Error output files
- Trace files
- Service Manager package or archive to reproduce problem
- Custom functions and agents in use
- Diagnostic Zip
- Transaction log
- Archive File
- IIA

For information on tracing, see the *iWay Service Manager User's Guide*.

User Feedback

In an effort to produce effective documentation, the Technical Content Management staff welcomes your opinions regarding this document. You can contact us through our website, <http://documentation.informationbuilders.com/connections.asp>.

Thank you, in advance, for your comments.

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Introducing the iWay Change Data Capture Solution for Informix

This section provides an overview of the iWay Change Data Capture (CDC) Solution for Informix, including key features and facilities.

In this chapter:

- ❑ [Features of the iWay Change Data Capture Solution for Informix](#)
 - ❑ [Architecture Overview of the iWay Change Data Capture Solution for Informix](#)
 - ❑ [Component Information for the iWay Change Data Capture Solution for Informix](#)
-

Features of the iWay Change Data Capture Solution for Informix

The iWay Informix CDC Agent is a key component of the iWay CDC Solution for Informix, which enables integration between IBM Informix Dynamic Server (IDS) and other iWay-accessible enterprise systems. The agent accomplishes this task by exploiting the IDS 11.5 CDC API, a significantly improved technology for Change Data Capture (CDC) over previous methods. The second component of this solution is the iWay Log Event Listener that runs on the target Oracle database server.

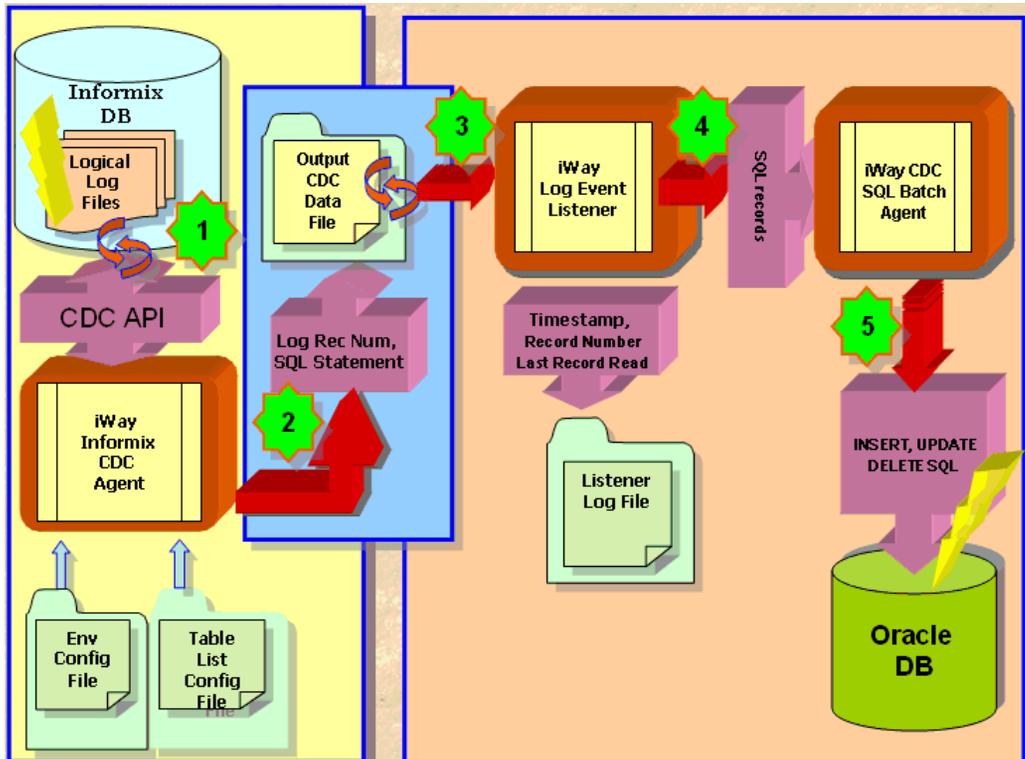
The combination of iWay Integration Technology and the IDS 11.5 CDC API provides:

- ❑ Real-time CDC capture and staging of CDC records in a standard form.
- ❑ Remote retrieval of IDS CDC records via shared file system.
- ❑ Natural queuing while network connections are unavailable.

This architecture exploits the IDS logging facilities, so that overall impact upon existing IDS systems is minimal. Security is ensured by limiting CDC data capture to only preselected schemas, tables and columns with an existing DBMS.

Architecture Overview of the iWay Change Data Capture Solution for Informix

The following diagram illustrates the architecture of the iWay Change Data Capture (CDC) Solution for Informix.



1. iWay Informix CDC Agent listens and reads the Informix Logical Log for INSERT, UPDATE, DELETE records using the Informix Change Data Capture (CDC) API.
2. The iWay Informix CDC Agent processes the records, composes the corresponding ANSI SQL statements, and then writes them into an Output CDC Data File.
3. iWay Log Event Listener listens to the Output CDC Data File and reads the SQL statements record by record.
4. iWay Log Event Listener transforms every SQL statement and feeds the iWay CDC SQL Batch Agent.
5. iWay CDC SQL Batch Agent applies SQL statements (INSERT, UPDATE, DELETE) to the target Oracle database tables.

Component Information for the iWay Change Data Capture Solution for Informix

The iWay Change Data Capture (CDC) Solution for Informix works in conjunction with the following components:

- iWay Service Manager
- Informix Dynamic Server
- Informix CDC API
- iWay Informix CDC Agent
- Output CDC Data File
- iWay Log Event Listener
- iWay CDC SQL Batch Agent

iWay Service Manager

iWay Service Manager is the heart of the Universal Adapter Framework and is an open transport service bus. Service Manager uses graphical tools to create sophisticated integration services without writing custom integration code by:

- Creating metadata from target applications.
- Transforming and mapping interfaces.
- Managing stateless processes.

Its capability to manage complex adapter interactions makes it ideally suited to be the foundation of a service-oriented architecture.

Informix CDC API

The Informix CDC API allows external client applications to capture transactional data from an IBM Informix Dynamic Server database. This API also provides functions to capture transactional data. A variety of clients can run these functions, such as JDBC, ODBC, ESQL/C, and DB Access. The data is returned as CDC records by standard IBM Informix smart large object read functions.

The iWay CDC Solution for Informix uses the Informix CDC API to replicate data from an IBM Informix Dynamic Server database to another, heterogeneous, database (for example, Oracle). The following types of operations are captured:

- INSERT

- DELETE
- UPDATE
- BEGIN
- COMMIT
- ROLLBACK

The Informix CDC API starts capturing transactions for a particular table from the current logical log position and processes all transactions sequentially.

If data capture is stopped, it can be restarted at a specific point in the logical logs where data capture was stopped. The Informix CDC API cannot be used to go backwards in time through the logical logs to capture the history of a table or perform random seeking in the logical logs.

The Informix CDC API does not capture changes to table schemas or any other database changes. The API can only provide data as that data is changing, it does not provide an initial snapshot of the contents of a table.

Data types that are not supported by the Informix CDC API include TEXT, BYTE, row, structure, sequence, and user-defined data types.

iWay Informix CDC Agent

The iWay Informix CDC Agent is a proprietary C-based application within the iWay CDC Solution for Informix, which leverages the Informix CDC API to access Logical Logs records data. The iWay Informix CDC Agent does not contain any hardcoded Informix account credentials.

Global variables for the program are retrieved from the Environment Configuration File. Database tables that are defined for replication are listed in the Table List Configuration File. Every entry in the table list has a table name and comma-separated columns list. The Table List Configuration File is generated by an ad-hoc shell script, using table name patterns as an input. All selected tables are listed along with all column names, excluding those of TEXT, BYTE, row, structure, sequence, and user-defined data types on which the Informix CDC API is not supported.

Output CDC Data File

When the Informix database is updated (for example, by new transactions), the iWay Informix CDC Agent generates the Output CDC Data File in a specified directory, which identifies the transactions that occurred in the database. For each transaction, the output file is updated with XML data, a transaction ID, and the type of transaction.

iWay Log Event Listener

The iWay Log Event Listener is a component of an iWay Service Manager (iSM) channel that is configured for a CDC Subscription. It listens for Output CDC Data Files in the Subscription output directory. The Output CDC Data Files contain transaction records in XML format. As soon as a new record is appended to a file in the Subscription output directory, the listener sends it to the iWay CDC SQL Batch Agent.

The iWay Log Event Listener interprets a carriage return character as a record delimiter. The listener keeps track of the last record that is read. If the listener is restarted, it resumes listening from that last record in the file.

iWay CDC SQL Batch Agent

The iWay CDC SQL Batch Agent (com.ibi.agents.XDCDCSQLBatchAgent) is a component of an iWay Service Manager (iSM) channel that is configured for a CDC Subscription. This agent is used to convert XML transaction records into ANSI SQL statements (INSERT, UPDATE, DELETE) and apply them to the target database tables. Output from the iWay Log Event Listener is used as input for the iWay CDC SQL Batch Agent. The agent must be configured to access a target database system (for example, Oracle).

SQL statements are grouped by transaction batches in the temporary files. A temporary batch file is created for every BEGIN_TX record and the SQL statements are appended to the file. When a COMMIT_TX statement is met, the SQL batch is applied to the target database. If a ROLBK_TX statement occurs, all transaction statements in the batch file are discarded.

Chapter 2

Installing and Configuring the iWay Change Data Capture Solution for Informix

This section describes how to install and configure the iWay Change Data Capture (CDC) Solution for Informix.

In this chapter:

- ❑ [Prerequisites for the iWay Change Data Capture \(CDC\) Solution for Informix](#)
 - ❑ [Installing the iWay CDC Solution for Informix](#)
 - ❑ [Installing the iWay Informix CDC Agent](#)
 - ❑ [Configuring the iWay CDC Solution for Informix](#)
-

Prerequisites for the iWay Change Data Capture (CDC) Solution for Informix

This section lists and describes prerequisite information for the iWay Change Data Capture (CDC) Solution for Informix.

- ❑ iWay Service Manager Version 7.0. For more information, see the *iWay Installation and Configuration Guide* and the *iWay Service Manager User's Guide*.
- ❑ Informix Dynamic Server Version 11.5.

Installing the iWay CDC Solution for Informix

The iWay CDC Solution for Informix is currently delivered as a patch, which must be applied to an existing 7.0 installation of iWay Service Manager (iSM). An iWay CDC option is also available directly from the main iSM installation utility.

When the patch is applied to an existing 7.0 installation of iSM, the following subdirectories are created:

- ❑ `<iway_home>/etc/manager/Informix`
- ❑ `<iway_home>/etc/setup/cdc/informix`
- ❑ `<iway_home>/etc/repository/manager/archive`

where:

`<iway_home>`

Is the location on your system where iSM is installed.

The `<iway_home>/etc/manager/Informix` subdirectory contains the following file:

`iwxcdc.jar`

The `<iway_home>/etc/setup/cdc/informix` subdirectory contains the following files:

`cdcagent.tar`

`readme.txt`

The `<iway_home>/etc/repository/manager/archive` subdirectory contains the following sample files, which are actually packaged archives:

`iway_package_informix_oracle_cdc_sregs-package.zip`

`iway_channelarchive_informix_oracle_cdc_replication.zip`

The installation of the patch also adds the following file to the `<iway_home>/lib` subdirectory:

`iwloglistener.jar`

Installing the iWay Informix CDC Agent

Once the patch for the iWay CDC Solution for Informix has been installed, you are ready to install the iWay Informix CDC Agent. The iWay Informix CDC Agent is packaged as a .tar file (`cdcagent.tar`) in the `<iway_home>/etc/setup/cdc/informix` subdirectory

You must copy the `cdcagent.tar` file to a directory on your UNIX system where Informix is installed. After you `untar` (extract) this file, the following directory structure is created along with the required configuration files:

```
cdcagent/  
cdcagent/bin/  
cdcagent/bin/iwaycdcagent.ec  
cdcagent/bin/iwaycdcagent  
cdcagent/bin/iway_runcdc.sh  
cdcagent/log/  
cdcagent/output/  
cdcagent/output/subscr/  
cdcagent/trace/  
cdcagent/config/  
cdcagent/config/iwaycdc.env  
cdcagent/config/subscr.env  
cdcagent/config/tabconfig.sh  
cdcagent/ctr/
```

Configuring the iWay CDC Solution for Informix

This section provides a roadmap that describes how to configure the iWay CDC Solution for Informix.

Configuring an Environment File

The first step that is required when configuring the iWay CDC Solution for Informix, is to create an environment file (.env), which sets and exports the properties of the Informix database. This is the database that will be accessed by the iWay CDC Solution for Informix.

For each Informix database, you will need to create a new environment file based on the subscr.env file, which is found in the `cdcagent/config` directory. You can create a duplicate of the subscr.env file and rename it for each subscription (for example, iwaycdc.env).

The following is a sample iwaycdc.env file that can be used for reference purposes:

```
#!/usr/bin/ksh
# Script name: iwaycdc.env
# Version: 1.1
#Description: The environment setup shell script for iwaycdc agent.
#Located in the $CDC_HOMEDIR/config directory.
#Sets up all global variables for general configuration of iwaycdc agent
#Usage: The iwaycdc.env script should be executed before executing
#iwaycdcagent program
#####
#Set up the iWay CDC_HOMEDIR path for cdcagent directory

#export CDC_HOMEDIR=/home/cdcagent
#Location of the iwaycdc home directory
export CDC_HOMEDIR=/home/iwayqa/cdcagent
#Setup the custom location for directories below or use the default
export CDC_BINDIR=${CDC_HOMEDIR}/bin
#Location of programs and shell scripts
export CDC_CONFIGDIR=${CDC_HOMEDIR}/config
#Location of env and config files
export CDC_OUTPUTDIR=${CDC_HOMEDIR}/output
#Location of CDC data
export CDC_LOGDIR=${CDC_HOMEDIR}/log
#Location of the message log files
export CDC_TRACEDIR=${CDC_HOMEDIR}/trace
#Location of the trace files
export CDC_ARCHIVEDIR=${CDC_HOMEDIR}/archive
#Location of the archived CDC data files
export CDC_CONTROLDIR=${CDC_HOMEDIR}/ctr
#Location of the control files
#Buffer size, bytes (max 2GB) - Not configurable, info only
CDC_BUFFSIZE=4096
# File names and extentions
export CDC_AGENT_PROG=iwaycdcagent
#Name of the iWay CDC Agent Program
export CDC_BASENAME="iwaycdc"
#Used to generate the output, log and trace files
export CDC_ENV_EXT="env"
#Environment files extention
export CDC_CONFIG_EXT="config"
#Config files extention
export CDC_TRACE_EXT="trc"

#Trace files extention
export CDC_LOG_EXT="log"
#Log files extention
export CDC_OUT_EXT="txt"
#CDC output data files extention
export CDC_CTRLSN_EXT="lsn"
#Extention of subscription LSN control files
export CDC_CTRFILE_EXT="seq"
#Extention of the control file
export CDC_MASTER_LOG=${CDC_LOGDIR}/${CDC_BASENAME}.${CDC_LOG_EXT}
#Master log file for iway_runcdc.sh
```

Identifying Tables and Columns

Once you have created a new environment file, you must execute the `tabconfig.sh` script, which is also found in the `cdcagent/config` directory. The `tabconfig.sh` script generates a list of tables and columns which are available in the Informix database and puts them in a file that uses the following naming convention:

```
subscrxxx.config
```

By default, every table and column is subscribed. The assumption prior to executing this file is that all of the environmental variables have been exported in the `.profile` or in the terminal. For more information on configuring and using the `tabconfig.sh` script, see [Using the Tabconfig.sh Script](#) on page 24.

Running the iWay Informix CDC Agent Application

Once the `tabconfig.sh` script is executed, you can execute the iWay Informix CDC Agent application by running the `way_runcdc.sh` startup script from the `/cdcagent/bin` directory. This script will access the environment file (`.env`), which was previously configured with the Informix variables. For more information on how to execute the `way_runcdc.sh` script, see [Running the iWay Informix CDC Agent Application](#) on page 27.

When the Informix database is updated (for example, by new transactions), the iWay Informix CDC Agent generates an output file in a specified output directory, which identifies the transactions that occurred in the database. For each transaction, the output file is updated with XML data, a transaction ID, and the type of transaction. Each subscription will also have its own directory. For each subscription you have created, you must execute the `way_runcdc.sh` startup script to access the proper files.

Configuring the iWay Log Event Listener

When the iWay Informix CDC Agent is running, it listens for changes in the Informix database and generates an output file (text file containing XML data) in a specified directory. You must configure the iWay Log Event Listener using iWay Service Manager to listen for this generated output file. The source directory for the iWay Log Event Listener is the one where the output file is written to.

iWay Service Manager will then read the transaction and convert it to XML format. Using the iWay CDC SQL Batch Agent (`com.ibi.agents.XDCDCSQLBatchAgent`) in a process flow, iWay Service Manager performs a Batch insert/update operation on the Oracle database. The sample channel and process flow that perform this operation are contained within the `<iway_home>/etc/repository/manager/archive` subdirectory.

Viewing Trace Files and Logs

The iWay CDC Solution for Informix provides two ways of checking for errors and logging the process: trace files and full logs. Trace files are located in the following directory:

`$CDC_HOMEDIR/trace/subscription`

The trace file is specific to a configuration and provides subscription, table, and column information. The generated trace file uses the following naming convention:

`iway_subscriptionname.txt`

where:

`subscriptionname`

Is the name of the subscription that is being used.

The location of the trace file is specified in the environment file (iwaycdc.env)

For full logs, the iwaycdc.log file is provided, which contains comprehensive information related to the entire CDC process. The iwaycdc.log file is located under the `/cdcagent/log` directory.

The specific location of the log file can also be specified in the environment file (iwaycdc.env).

In addition, iWay log files can also be examined and are located in the following directory:

`IWAY_HOME/config/base/log`

An example of an iWay log file is iway01.log.

This section describes how to configure iWay Change Data Capture (CDC) components.

In this chapter:

- [Understanding the Table List Configuration File](#)
 - [Understanding CDC Subscription](#)
 - [Configuring the iWay Informix CDC Agent](#)
 - [Modifying an Informix Table Marked for Replication](#)
 - [Configuring the iWay Log Event Listener](#)
 - [Configuring the iWay CDC SQL Batch Agent](#)
-

Understanding the Table List Configuration File

Database tables that are defined for replication are listed in the Table List Configuration File. Every entry in the table list has a table name and comma-separated columns list. The Table List Configuration File is generated by an ad-hoc shell script (`tabconfig.sh`), using table name patterns as an input. All selected tables are listed along with all column names, excluding those of TEXT, BYTE, row, structure, sequence, and user-defined data types on which the Informix CDC API is not supported.

The file name format for the Table List Configuration File uses a subscription name as the base name and the following extension:

```
`.config' (subscr001.config)
```

The file record contains database/table/column names in the following format:

```
dbname@owner.tablename>col1,col2,col3,...,.....,colN
```

Users can modify the Table List Configuration File by removing or commenting out the rows using '#' characters, and removing column names. However, the Primary Key Columns must not be removed.

The following is a sample Table List Configuration File for the STORES demo database:

```
stores@informix.call_type>call_code,code_descr
stores@informix.catalog>catalog_num,stock_num,manu_code,cat_advert
stores@informix.classes>classid,class,subject
stores@informix.cust_calls>customer_num,call_dtime,
user_id,call_code,call_descr,res_dtime,res_descr
stores@informix.customer>fname,lname,company,
address1,address2,city,state,zipcode,phone,customer_num
stores@informix.employee>givenname,familyname,phone
stores@informix.items>item_num,order_num,stock_num,
manu_code,quantity,total_price
stores@informix.manufact>manu_code,manu_name,lead_time
stores@informix.orders>order_num,order_date,
customer_num,ship_instruct,backlog,po_num,
ship_date,ship_weight,ship_charge,paid_date
stores@informix.state>code,sname
stores@informix.stock>stock_num,manu_code,
description,unit_price,unit,unit_descr
stores@informix.warehouses>warehouse_name,warehouse_id,warehouse_spec
```

Using the Tabconfig.sh Script

The tabconfig.sh is a shell script that generates table information for a CDC configuration file.

The only required parameter for this script is a database name (-d <dbname>). The input options for the script include:

- A full table name (-i customer).
- An included table names pattern (-i c*).
- An excluded table names pattern (-e cust_*).
- A table name list file (-f tabs.list).

The output record lists all table columns, except for those with unsupported data types.

Usage:

```

=====
Script tabconfig.sh. iWay Software. All Rights Reserved.
=====
Usage: tabconfig.sh -d <dbname> [-i <incl_tab_pattern>] [-e <excl_tab_pattern>] \
      [-f <output file>] [-r ]
      or
      -v <file list>

Where:
-d <dbname>           - database name;
-o <owner>           - tables owner name;
-i <incl_tab_pattern> - table names pattern to include for replication;
-e <excl_tab_pattern> - table names pattern to exclude from replication;
-f <table list file>  - A path to the input table name list file;
-r                 - displays table columns with unsupported types (BYTE,TEXT,SET,ROW)
-v <config file>     - Validates existing or previously generated config file for db names,
                    table names and column names;

Example 1.
Lists all tables/columns for stores db to the standard output:
>tabconfig.sh -d stores

Example 2.
Generates an output for the tables listed in the file tab_names.list:
>tabconfig.sh -d stores -f tab_names.list

Example 3.
Lists all tables owned by informix, with names starting "c"
and excluding names starting with "cust_".
>tabconfig.sh -d stores -o informix -i c* -e cust_*

Example 4.
Lists the table columns with unsupported types.
These columns are not listed otherwise (no "-r" flag).
>tabconfig.sh -d stores -r

Example 5.
Validates all names in the list file "stores.list".
Checks that the database, table and column names do exist.
>tabconfig.sh -v stores.list

```

The tabconfig.sh script can report on the unsupported columns in a database.

For example:

```

$ tabconfig.sh -d stores -r
Not Supported Columns Report:
stores@informix.catalog>cat_descr,cat_picture
stores@informix.employee>address

```

You can edit the configuration file to remove fields that are not required. The `tabconfig.sh` script also includes an option to validate a configuration file for database, table, and column names.

Understanding CDC Subscription

Subscription is a logically and physically separated process defined for source-target CDC replication.

Each subscription consists of its own configuration files, Informix CDC Agent UNIX process, Shared Memory Buffer Structure, log file, trace files, output data files, and a separate instance of an iWay Service Manager (iSM) channel.

Any Informix database can have multiple subscriptions and any subscription can be defined on one database only. A database table cannot belong to more than one subscription.

Subscription Control Files

Subscription control files are stored in the `ctr` subdirectory under `CDC_HOMEDIR`. Every subscription has two invisible control files:

- ❑ `.<subscr>.seq`

- ❑ `.<subscr>.lsn`

where:

`<subscr>`

Represents a specific subscription name.

The `.seq` control file stores IDs for the next output and trace file, for example:

```
TRACE_FILE_CNTRL_NO=11
TRANSACTION_FILE_CNTRL_NO=13
```

The next output or trace file will be created using this ID and will increment the value in the `.seq` control file.

The `.lsn` control file stores the value of the Last Sequence Number (LSN) that was written by the iWay Informix CDC Agent into the output file generated by the iWay Informix CDC Agent. This value is updated for every CDC record and has the following format:

```
89:0x16b4048$
```

Subscription Environment Files

A subscription environment file is created for every subscription. The base name of this file must be identical to the subscription name and the environment variables in this file must only serve the specified subscription.

All directory names are derived from the iWay CDC environment file (`iwaycdc.env`) by default and can be configured. The variables include:

- ❑ `INFORMIXSERVER`, `INFORMIXDIR`, `PATH` – Must be set.

- ❑ `CDC_DBNAME` - Database name for the subscription, must be set.

- ❑ `OUTPUTDIR`, `LOGDIR`, and `TRACEDIR` subscription directories are separate for each subscription.
- ❑ Trace mode - TRACE, DEBUG, INFO, WARNING, ERROR, or FATAL
- ❑ Timeout - No timeout value is set by default.
- ❑ Max output file size - By default, 10MB is allocated.

Output CDC Data Files

Output files with CDC data are created in the subscription output directory and have the following format:

```
iwaycdc_<subscription>_<file ID>.txt
```

where:

<subscription>

Is the subscription name. The `iwaycdc` base name and `.txt` extension can be configured in the iWay CDC environment file (`iwaycdc.env`).

<file_ID>

is a numeric incrementing number, starting from 1. When the output file reaches a maximum size, a new file with the next ID is created. When the CDC subscription process is restarted, a new file is created with the next ID.

Configuring the iWay Informix CDC Agent

iWay Informix CDC Agent listens and reads the Informix Logical Log for INSERT, UPDATE, DELETE records using the Informix Change Data Capture (CDC) API.

Running the iWay Informix CDC Agent Application

The `iway_runcdc.sh` startup script is used to execute the iWay Informix CDC Agent application. The following command structure must be used to execute the `iway_runcdc.sh` script:

```
iway_runcdc.sh -E <cdc_env_file> -S <subscr_name> -L <LSN param>
```

where:

<cdc_env_file>

Is the full path to the iWay CDC environment file (`iwaycdc.env`).

`<subscr_name>`

Is the predefined subscription name.

`<LSN param>`

Can be either 0 (zero), if you are starting new CDC session, a Last Sequence Number (LSN) using the `<log id>:0x<position>` format, or the keyword `resume`, which automatically retrieves the LSN from the subscription control file.

For example:

```
iway_runcdc.sh -E /home/iwayqa/cdcagent/config/iwaycdc.env -S subscr001 -L 0
```

You can check if the Informix CDC is running by grepping for the process:

```
$ ps -ef | grep iwaycdc
```

Understanding the iWay CDC Environment File (iwaycdc.env)

The iWay CDC environment file (`iwaycdc.env`) is passed to the `iway_runcdc.sh` startup script as a parameter. By executing this environment file, the iWay Informix CDC Agent application sets the general global environment variables for the iWay Informix CDC instance.

The `CDC_HOMEDIR` variable must be set in the `iwaycdc.env` file. All remaining variables have default values, but are also configurable:

- `CDC_BINDIR`
- `CDC_CONFIGDIR`
- `CDC_OUTPUTDIR`
- `CDC_LOGDIR`
- `CDC_TRACEDIR`
- `CDC_ARCHIVEDIR`
- `CDC_CONTROLDIR`

File names and extensions include `.env`, `.txt`, `.ctr`, `.trc`, `.lsn`, and `.seq`.

Shutting Down the iWay Informix CDC Agent Application

The `InformixLEAShutdown.sh` script is used to shut down the iWay Informix CDC Agent and all of its processes. The `InformixLEAShutdown.sh` script calls a C binary program, which can either stop the logging process and completely shut down the agent or just stop the agent.

Based on your requirements, the following methods are available to shut down the iWay Informix CDC Agent:

- ❑ If you need to alter an existing table that is a part of the subscription, you must execute the shut down script using the *nologging* option. This option disables logging on all tables and allows for any alter tables. Enter the following command to execute the shut down script using the *nologging* option:

```
$ ./informixLEAShutdown.sh nologging
```

The following message is logged to the command window:

```
iwaycdcagent will be brought down and the logging will be turned off to allow Informix table changes
```

- ❑ If you need to shut down the iWay Informix CDC Agent and leave full row logging enabled for the table, you must execute the shut down script with no parameters. You can use this option to test INSERT, UPDATE, DELETE operations for replication if the iWay Informix CDC Agent is not running. In order for these updates to be captured, full row logging must be enabled for the table. Executing the shut down script with no parameters ensures that the iWay Informix CDC Agent is shut down, but full row logging is still enabled. Enter the following command to shut down the iWay Informix CDC Agent and leave logging enabled:

```
$ ./informixLEAShutdown.sh
```

The following message is logged to the command window:

```
./informixLEAShutdown.sh starting
iwaycdcagent will be brought down but logging will remain on.
iwaycdcagent has been brought down successfully with logging on
```

Note: If the iWay Informix CDC Agent unexpectedly shuts down, you will need to restart it using the `-RESUME` command to ensure that all records are picked up from the Last Sequence Number (LSN).

iWay Informix CDC Agent Output File

The output file that is generated by the iWay Informix CDC Agent is a text file containing XML data. There is a predefined XML format for every supported transaction record type:

- ❑ BEGIN_TX
- ❑ COMMIT_TX
- ❑ ROLLBK_TX
- ❑ INSERT_TX

- UPDBEF_TX
- UPDAFT
- DELETE_TX

The following is a sample XML record for the BEGIN_TX record type:

```
<transaction database="stores" table="informix.manufact" type="BEGIN_TX"
lsn="52:0x14965bc" transactionid="25" transactiontime="2009-12-14
16:46:17"></transaction>
```

The following is a sample XML record for the COMMIT_TX record type:

```
<transaction database="stores" table="informix.manufact" type="COMMIT_TX"
lsn="52:0x14968bc" transactionid="25" transactiontime="2009-12-14
16:46:17"></transaction>
```

The following is a sample of an INSERT transaction record in XML format:

```
<transaction database="stores" table="informix.customer" type="INSERT"
lsn="52:0x1496624" transactionid="25"><column name="customer_num"
type="SQLINT" key="true "><![CDATA[259]]></column><column name="fname"
type="SQLCHAR" key="false"><![CDATA[John          ]]></column><column
name="lname" type="SQLCHAR" key="false"><![CDATA[King          ]]></
column><column name="company" type="SQLCHAR" key="false"><![
CDATA[iWay          ]]></column><column name="address1" type="SQLCHAR"
key="false"><![CDATA[2 Penn Plaza ]]></column><column name="address2"
type="SQLCHAR" key="false"><![CDATA[Madison Sq. Garden ]]></column><column
name="city" type="SQLCHAR" key="false"><![CDATA[New York   ]]></
column><column name="state" type="SQLCHAR" key="false"><![CDATA[NY ]]></
column><column name="zipcode" type="SQLCHAR" key="false"><![CDATA[10121]]></
column><column name="phone" type="SQLCHAR" key="false"><![
CDATA[222-333-4444          ]]></column></transaction>
```

iWay Informix CDC Agent Data File Name

iWay Informix CDC Agent writes the XML CDC data into a text file. The CDC data file name has the following format:

```
{ $ CDC_BASENAME }_{ $ CDC_SUBSCR_NAME }_YYYYMMDD_NNNN.$ { CDC_OUT_EXT }
```

where:

`CDC_BASENAME`

Is the program name. The environment variable is set in the `ipaycdc.env` file (default) located in the config directory.

`CDC_SUBSCR_NAME`

Is the subscription name. The environment variable is set in the `subscrname.env` file located in the config directory. It is passed to the `ipaycdcagent` program as an argument with the `-S` command line option.

`YYYYMMDD`

Is the current date when the CDC data file is created.

`NNNN`

Is the serial four-digit number. Starts with 0001, left padded by 0. Increments for a duration of the day, specified in the DATE above. Resets to 0001 at 00:00 am along with a new DATE, when a new CDC data file is created.

`CDC_OUT_EXT`

Is the extension of the CDC data file (.txt by default). The environment variable is set in the `ipaycdc.env` file (default) located in the config directory.

For example:

```
ipaycdc_subscr01_20091214_0015.txt
```

The CDC data files are located in the following directory (separate for every subscription):

```
${CDC_OUTPUTDIR}/${ CDC_SUBSCR_NAME }
```

iWay Informix CDC Agent Trace File Name

iWay Informix CDC Agent Trace File Name has the same format as the CDC data file, but only uses a different extension.

The trace file extension (.trc by default) is set as an environment variable in the `ipaycdc.env` file (default) located in the config directory.

The trace files are located in the following directory (separate for every subscription):

```
${CDC_OUTPUTDIR}/${ CDC_SUBSCR_NAME }
```

Modifying an Informix Table Marked for Replication

If you have a requirement to modify any Informix table that is marked for replication, you must first shut down the iWay Informix CDC Agent application by using the `InformixLEAShutdown.sh` script. For more information, see [Shutting Down the iWay Informix CDC Agent Application](#) on page 28.

Once the iWay Informix CDC Agent application is shut down and all processes have stopped, you can modify your Informix table as required.

After your Informix table is modified, you must use the `UPDATE` command to update a dummy record into that table.

For example:

```
UPDATE tablename SET fieldname=fieldname;
```

You can use the `ONCHECK` command that is provided by Informix to check the structure of the modified table.

For example:

```
Oncheck -pT databasename/tablename |more
```

Note: After you have used the `UPDATE` command to update the Informix table, the `Version (oldest)` should be set to 0.

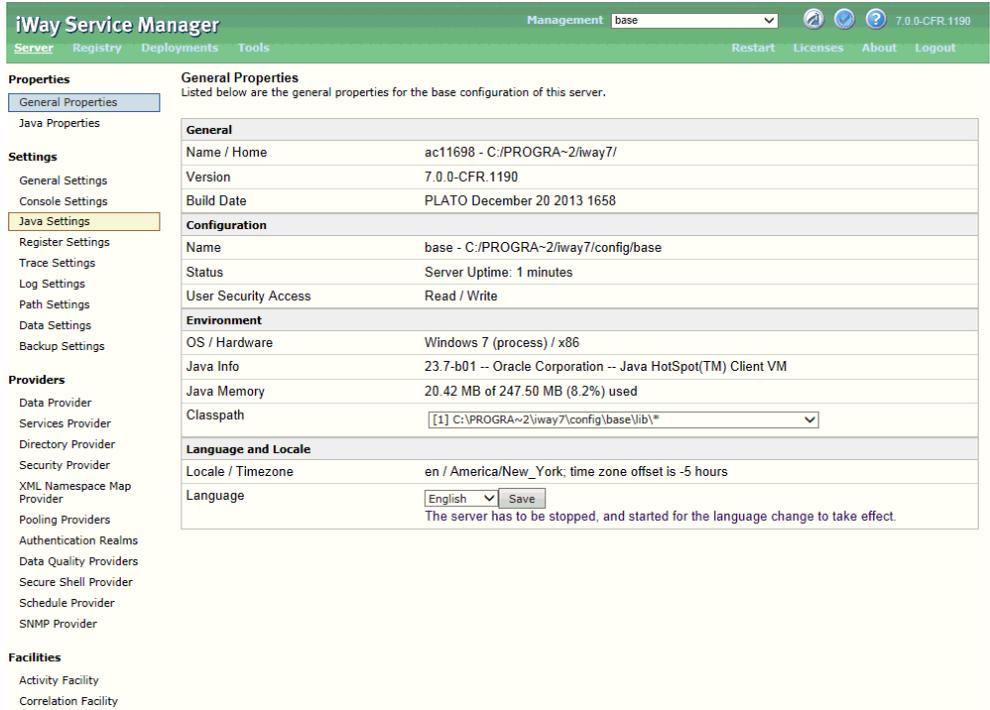
Configuring the iWay Log Event Listener

iWay Log Event Listener listens to the Output CDC Data File that is generated by the iWay Informix CDC Agent and reads the SQL statements record by record.

Procedure: How to Configure the iWay Log Event Listener

To configure the iWay Log Event Listener using the iWay Service Manager Administration Console:

1. From the Windows Start menu select *All Programs, iWay 7.0 Service Manager, and then Console.*



iWay Service Manager Management base 7.0.0-CFR.1190

Server Registry Deployments Tools Restart Licenses About Logout

Properties

- General Properties
- Java Properties

Settings

- General Settings
- Console Settings
- Java Settings
- Register Settings
- Trace Settings
- Log Settings
- Path Settings
- Data Settings
- Backup Settings

Providers

- Data Provider
- Services Provider
- Directory Provider
- Security Provider
- XML Namespace Map Provider
- Pooling Providers
- Authentication Realms
- Data Quality Providers
- Secure Shell Provider
- Schedule Provider
- SNMP Provider

Facilities

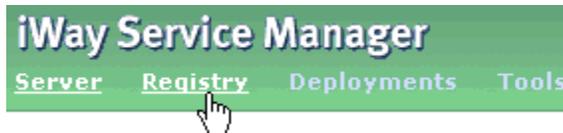
- Activity Facility
- Correlation Facility

General Properties
Listed below are the general properties for the base configuration of this server.

General	
Name / Home	ac11698 - C:/PROGRA~2/iway7/
Version	7.0.0-CFR.1190
Build Date	PLATO December 20 2013 1658
Configuration	
Name	base - C:/PROGRA~2/iway7/config/base
Status	Server Uptime: 1 minutes
User Security Access	Read / Write
Environment	
OS / Hardware	Windows 7 (process) / x86
Java Info	23.7-b01 -- Oracle Corporation -- Java HotSpot(TM) Client VM
Java Memory	20.42 MB of 247.50 MB (8.2%) used
Classpath	[1] C:\PROGRA~2\iway7\config\base\lib*
Language and Locale	
Locale / Timezone	en / America/New_York; time zone offset is -5 hours
Language	English Save

The server has to be stopped, and started for the language change to take effect.

2. Click *Registry* in the top pane.



3. In the left pane, select *Listeners*.

Components

- Adapters
- Decryptors
- Ebix
- Emitters
- Encryptors
- Listeners**
- Preemitter
- Preparsers
- Reviewers
- Rules
- Schemas
- Services
- Transforms

The Listeners pane opens, as shown in the following image.

Listeners

Listeners are protocol handlers, that receive input for a channel from a configured endpoint. Listed below are references to the listeners that are defined in the registry.

Listeners

Filter By Name Where Name Equals

<input type="checkbox"/>	Name	Type	References	Description
<input type="checkbox"/>	carphone-load	schedule		iw:Creates an event every 5 seconds
<input type="checkbox"/>	file1	File		A default/sample file listener.
<input type="checkbox"/>	javadoc	http		The javadoc listener is used to make the iWay Service Manager API available to a remote browser.
<input type="checkbox"/>	pictures.loader	File		The pictures listener locates files with a variety of common image file extensions (img, gif, jpg, ...).
<input type="checkbox"/>	pictures.viewer	http		The pictures.viewer is used to kickoff the image retrieval process as defined by the pictures sample.
<input type="checkbox"/>	scifibooks	schedule		This listener is defined for use by the SciFi Books sample. It wakes up daily and kicks off the update for the channel.

The table that is provided lists existing listeners and a short description for each.

4. Click *Add*.

The Listener Type pane opens.

Listeners

Listeners are protocol handlers, that receive input for a channel from a configured endpoint. Listed below are defined in the registry.

Select listener type

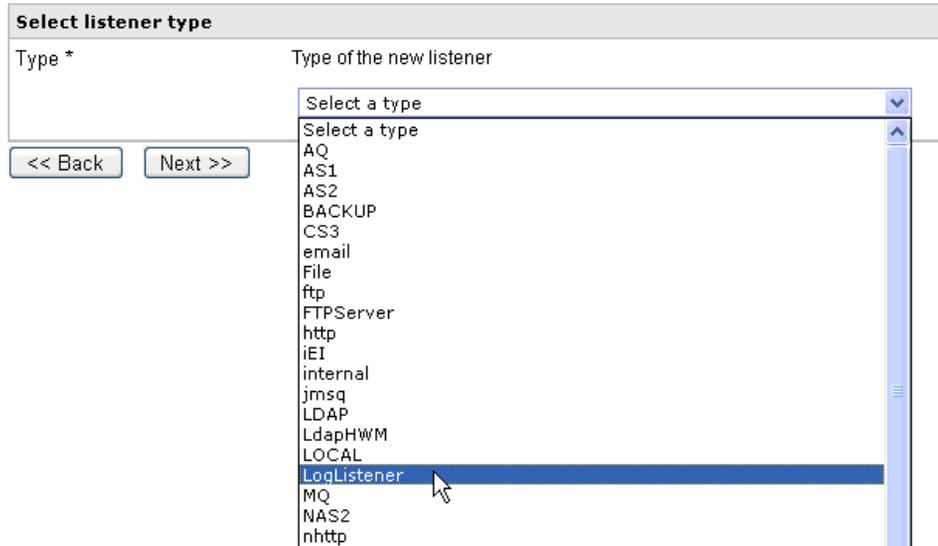
Type *

Type of the new listener

<< Back Next >>

Select a type

- Select a type
- AQ
- AS1
- AS2
- BACKUP
- CS3
- email
- File
- ftp
- FTPServer
- http
- iEI
- internal
- jmsq
- LDAP
- LdapHWM
- LOCAL
- LogListener**
- MQ
- NAS2
- nhttp



5. Select *LogListener* from the Type drop-down list and click *Next*.

The configuration parameters pane for the iWay Log Event Listener (LogListener) opens.

Listeners

Listeners are protocol handlers, that receive input for a channel from a configured endpoint. Listed below are references to the listeners that are defined in the registry.

Configuration parameters for new listener of type LogListener	
Accepts non-XML (flat) only	If true, listener expects flat (non-XML). Automatic parsing is not performed. false Pick one
Log Directory *	
File Name Pattern *	
Marker Property File *	
Poll Interval (seconds) *	
Batch Size *	
Filter	
Key	
Key Position	
Key Position Type	column Pick one
Key Position Delimiter	space Pick one
Is Key Type Date	false Pick one
Date Input Format	EEE MMM dd HH:mm:ss yyyy Pick one
Date Input Format	EEE MMM dd HH:mm:ss yyyy Pick one
Advanced	
Execution Time Limit	Time limit for document execution(in seconds) before it is cancellation is attempted. (Also see system property "kill interval". This applies to agent stacks and sets a lower limit for process flows.) 1
Multithreading	Number of documents that can be processed in parallel 1
Maximum threads	Parallel threads can grow to this count automatically on demand 1

<< Back Next >>

6. Provide the required configuration parameters for the new listener, which are described in [iWay Log Event Listener \(LogListener\) Configuration Parameters](#) on page 37.
7. Click Next.

The Name and Description pane opens.

8. In the Name field, type a name to identify the iWay Log Event Listener (for example, *LogEvent_Listener*).
9. In the Description field, type an optional description for the iWay Log Event Listener.
10. Click *Finish*.

The new File listener (*LogEvent_Listener*) is added to the list in the Listeners pane.

Reference: iWay Log Event Listener (LogListener) Configuration Parameters

Parameter	Description
Accepts non-XML (flat) only	If set to <i>true</i> , the listener expects flat (non-XML) documents. Automatic parsing is not performed. The default value is <i>false</i> .
Log Directory *	Specifies the log directory to be used. For example: <code>/home/iwayqa/cdcagent/output/subscr002/</code> You can also specify this value using a Special Register (SREG).
File Name Pattern *	Specifies the file name pattern to be used. For example: <code>iwaycdc_subscr002_*.txt</code> You can also specify this value using a Special Register (SREG).
Marker Property File *	Specifies the marker property file. For example: <code>newTest.properties</code>
Poll Interval (seconds) *	Specifies the polling interval (in seconds) to be used. For example, 0.
Batch Size *	Specifies the batch size amount to be used. For example, 1.
Filter	Specifies the filter to be used.
Key	Specifies the key to be used.
Key Position	Specifies the key position to be used.
Key Position Type	Specifies the key position type. Select <i>column</i> or <i>token</i> from the drop-down list. By default, <i>column</i> is selected from the drop-down list.

Parameter	Description
Key Position Delimiter	Specifies the key position delimiter character to be used. Select <i>space</i> or <i> </i> from the drop-down list. By default, <i>space</i> is selected from the drop-down list.
Is Key Type Date	Determines whether the key is type date. By default, <i>false</i> is selected from the drop-down list.
Date Input Format	Specifies the input format of the date to be used. By default, <i>EEE MMM dd HH:mm:ss yyyy</i> is selected from the drop-down list.
Date Input Format	Specifies the input format of the date to be used. By default, <i>EEE MMM dd HH:mm:ss yyyy</i> is selected from the drop-down list.
Advanced	
Execution Time Limit	Specifies a time limit for document execution (in seconds) before cancellation is attempted.
Multithreading	Specifies a number of documents that can be processed in parallel. The default value is 1.
Maximum threads	Parallel threads can grow to the specified count automatically on demand. The default value is 1.

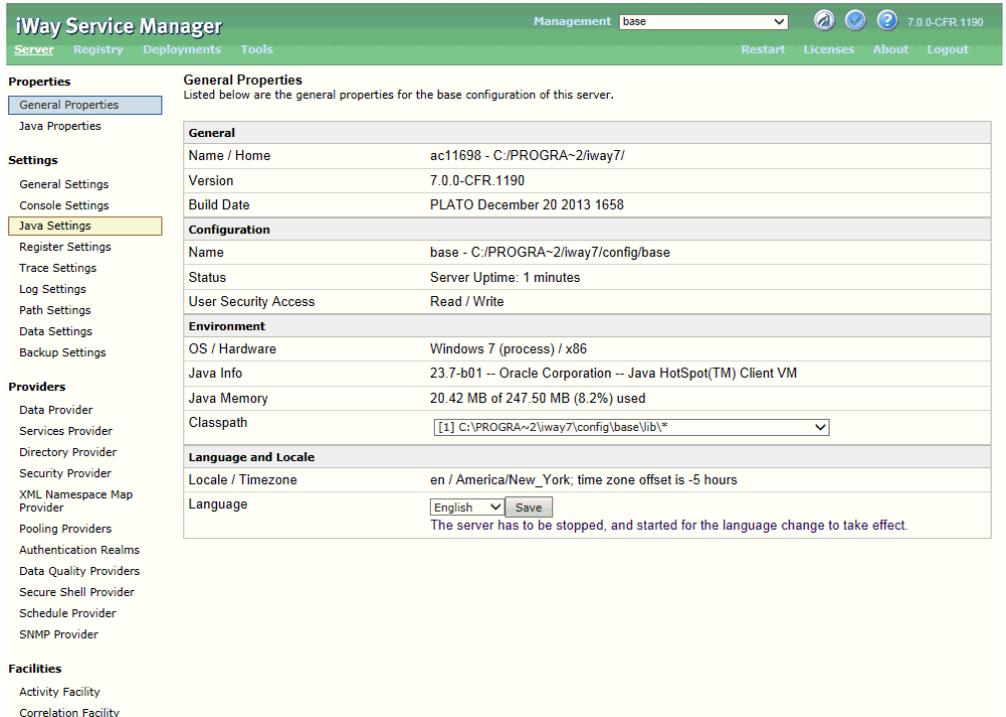
Configuring the iWay CDC SQL Batch Agent

The iWay CDC SQL Batch Agent applies SQL statements (INSERT, UPDATE, DELETE) to the target Oracle database tables.

Procedure: How to Configure the iWay CDC SQL Batch Agent

To configure the iWay CDC SQL Batch Agent using the iWay Service Manager Administration Console:

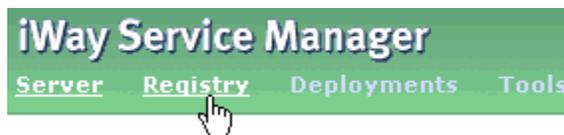
1. From the Windows Start menu select *All Programs, iWay 7.0 Service Manager, and then Console.*



The screenshot displays the iWay Service Manager Administration Console. The top navigation bar includes 'Server', 'Registry', 'Deployments', and 'Tools'. The main content area is divided into 'Properties' and 'General Properties'. The 'General Properties' section is active, showing a table of server configuration details.

General Properties	
Listed below are the general properties for the base configuration of this server.	
General	
Name / Home	ac11698 - C:/PROGRA~2/iway7/
Version	7.0.0-CFR.1190
Build Date	PLATO December 20 2013 1658
Configuration	
Name	base - C:/PROGRA~2/iway7/config/base
Status	Server Uptime: 1 minutes
User Security Access	Read / Write
Environment	
OS / Hardware	Windows 7 (process) / x86
Java Info	23.7-b01 -- Oracle Corporation -- Java HotSpot(TM) Client VM
Java Memory	20.42 MB of 247.50 MB (8.2%) used
Classpath	[1] C:\PROGRA~2\iway7\config\base\lib*
Language and Locale	
Locale / Timezone	en / America/New_York; time zone offset is -5 hours
Language	English <input type="button" value="Save"/>
The server has to be stopped, and started for the language change to take effect.	

2. Click *Registry* in the top pane.



- In the left pane, select *Services*.

Components

- Adapters
- Decryptors
- Ebix
- Emitters
- Encryptors
- Listeners
- Preemitters
- Preparsers
- Reviewers
- Rules
- Schemas
- Services**
- Transforms

The Service pane opens, as shown in the following image.

Services

Services are executed java procedures that handle the business logic of a message.

Services

Filter

<input type="checkbox"/>	Name	Type	References	Parms	Description
<input type="checkbox"/>	DeleteAllSciFiBooks1	Constant Agent			Seta a call to the RDBMS Adapter to delete all records from the SciFiBooks Database.
<input type="checkbox"/>	move1	Move Agent			The move1 service defines a move agent that moves the input document stream to the output document stream. It represents the basic echo pattern in iSM.
<input type="checkbox"/>	pictures_img2xml	Entag Agent			converts the image to base64 and wraps it in a <picture> tag
<input type="checkbox"/>	pictures_iterator	XML Iterator			Iterate a loop for each portion of an XML document
<input type="checkbox"/>	RSSRead1	HTTP Read Agent		0	Reads an RSS Document from url that is specified in the original incomming document.
<input type="checkbox"/>	Snip1	Snip Agent			Copies a subtree of the input document as defined by the PFIVP schema to the root of the output document as defined by PFIVPResponse schema.

The table that is provided lists existing services and a short description for each.

4. Click *Add*.

The Services Type pane opens.

Services
Services are executed java procedures that handle the business logic of a message.

Select the type for the new Service object definition

Type *	Available Service types	
	<input type="text" value="com.ibi.agents.XDCDCSQLBatchAgent"/>	Converts xml format cdc output into dml and execute batch statements
	<input type="text" value="Select a type"/>	

<< Back Next >>

5. Select *com.ibi.agents.XDCDCSQLBatchAgent* from the Type drop-down list and click *Next*.

The configuration parameters pane for the iWay CDC SQL Batch Agent opens.

Configuration parameters for CDCSQL Batch Agent service	
Source Database *	Source of data <input type="text" value="INFORMIX"/> Pick one
Target Database *	Target of data <input type="text" value="ORACLE"/> Pick one
JDBC DataSource Properties (connect using DataSource via JNDI)	
JNDI Name	JNDI name for the requested data source. To use an iWay JDBC provider, specify as jdbc/provider. Required if using JNDI. <input type="text"/>
JDBC Connection Properties (connect using Driver Manager)	
Table File Path	File path for property files for column map for tables <input type="text"/>
Column File Path	File path for property files for column map for tables <input type="text"/>
Data Source URL	URL to reach the data source. Required unless using JNDI DataSource. <input type="text"/>
JDBC Driver	JDBC driver to use. Required unless using JNDI DataSource. <input type="text"/>
User ID	Default user id for connection <input type="text"/>
Password	Default password for connection <input type="text"/>
Batch Type *	Select batch type <input type="text" value="Auto"/> Pick one
Batch Size	Auto {Auto} Manual {Manual} <input type="text" value="1"/>
<input type="button" value=" << Back"/> <input type="button" value=" Next >> "/>	

6. Provide the required configuration parameters for the new agent, which are described in [iWay CDC SQL Batch Agent Configuration Parameters](#) on page 43.
7. Click *Next*.
 The Name and Description pane opens.
8. In the Name field, type a name to identify the iWay CDC SQL Batch Agent (for example, *SQLBatchAgent_Service*).
9. In the Description field, type an optional description for the iWay CDC SQL Batch Agent.

10. Click *Finish*.

The new iWay CDC SQL Batch Agent (SQLBatchAgent_Service) is added to the list in the Services pane.

Reference: iWay CDC SQL Batch Agent Configuration Parameters

Parameter	Description
Configuration parameters for CDCSQL Batch Agent service	
Source Database *	The source database for the CDC data. The following databases are available from the drop-down list: <ul style="list-style-type: none"> <input type="checkbox"/> INFORMIX (default) <input type="checkbox"/> ORACLE <input type="checkbox"/> SQLServer
Target Database *	The target database for the CDC data. ORACLE is the database option that is selected by default.
JDBC DataSource Properties (connect using DataSource via JNDI)	
JNDI Name	JNDI name for the requested database. To use an iWay JDBC provider, specify as <i>jdbc/provider</i> . This is a required parameter if you are using JNDI.
JDBC Connection Properties (connect using Driver Manager)	
Table File Path	File path for property files for column map for tables.
Column File Path	File path for property files for column map for tables.
Data Source URL	URL to reach the data source. This parameter is required unless you are using a JNDI data source.
JDBC Driver	JDBC driver to use. This parameter is required unless you are using a JNDI data source.
User ID	Default user ID for the connection.
Password	Default password for the connection.

Parameter	Description
Batch Type	<p>Represents a batch execute with auto commit or manual commit options. Select one of the following commit types from the drop-down list:</p> <ul style="list-style-type: none"> <li data-bbox="554 399 645 426"><input type="checkbox"/> Auto Commits automatically regardless of the batch size. <li data-bbox="554 507 676 534"><input type="checkbox"/> Manual Splits the entire batch by the value that is specified in the Batch Size field. In addition, a batch execute is applied on the sub-batches and eventually an exclusive commit is applied after all the sub-batches are executed.
Batch Size	<p>If <i>Manual</i> is selected from the Batch Type drop-down list, then specify the batch size that you want to set in this field.</p>



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iWay

/ iWay Change Data Capture Solution for Informix

Version 7.0.x and Higher

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