DB2 Server for VSE & VM

DB2® DataPropagator™ Q Capture Supplement

Version 7 Release 4

DB2 Server for VSE & VM

DB2® DataPropagator™ Q Capture Supplement

Version 7 Release 4

Before using this information and the product it supports, be sure to read the general information under “Notices” on page 55.

Contents

About this manual v
Who should read this book v
Text conventions used in this book v

Chapter 1. Introduction to DB2 DataPropagator Q Capture on VSE and VM 1
Overview 1
Limitations of the DB2 DataPropagator Q Capture program 1
MQ environment 2

Chapter 2. Setting up the Q Capture program on VM 5
Overview 5
MQ setup for VM 5
VM setup 5
Setting up replication from sources to targets . . . 6

Chapter 3. Setting up the Q Capture program on VSE 7
Overview 7
MQ Setup for VSE 7
Setting up replication from sources to targets . . . 10

Chapter 4. Running the Q Capture program on VSE or VM. 11
Overview 11
Starting a Q Capture program 11
Prerequisites 11
Procedure 12
Considerations when cold starting a Q Capture program 13
When to cold start a Q Capture program . . . 13
Possible problems that can result from cold starts of the Q Capture program 13
Preventing unexpected cold starts of the Q Capture program 13
Related concepts. 13
Related tasks 13
Parameters of a Q Capture program 14
Parameters of a Q Capture program - overview 14
Descriptions of Q Capture parameters 15
adminq. 15
autostop 16
commit_interval 16
logreuse 17
logstdout 17
memory_limit 17
prune_interval 18
qmgr 18
restartq. 19
signal_limit 19
sleep_interval. 19
startmode 20
term. 21
trace_limit. 21
Changing the Q Capture parameters 21
Changing the Q Capture parameters - overview 21
Methods of changing the Q Capture operating parameters 21
Changing saved parameters in the IBMQREP_CAPPARMS table 21
Setting parameter values at startup 22
Dynamically changing parameters while a Q Capture program is running. 22
Activating Q subscriptions 22
Deactivating Q subscriptions 23
Stopping a Q Capture program. 24
Operator commands 25
Command - STOP 25
Command - REINIT 26
Command - REINITQ 26
Command - QRYPARMS 27
Command - CHGPARMS. 27
Command - PRUNE 28
Command - STATUS 28
Signals 29
Signals - CAPSTOP. 30
Signals - CAPSTART 30
Signals - REINIT_SUB 31
Signals - LOADDONE. 31
Signals - QINERROR 32
Signals - IGNORETRANS. 32
Signals - STOP 33
Initial load. 33
Loading options 33
Automatic load 34
Manual load 36
No load 37
Recommendations for loading 37
Starting Capture. 38
Starting the Q Capture program on VM 38
Starting the Q Capture program on VSE. . . . 38
Starting the Q Apply program 38

Chapter 5. Running the Q Capture program on VM and VSE (target is a VM or VSE platform) 39
Overview 39
Setting up the federated system 39

Chapter 6. Problem diagnosis 41
Overview 41
Tracing 41
FILEDEFs on VM 41
Turning trace on and off 41
Formatting and reading trace output 42

Chapter 7. Important hints and tips . . 43
Overview 43
Control table considerations 43
Default values in control tables 43
Dataspace considerations 44
Storage Considerations 44
VSE queue maintenance considerations 44

Appendix. Q Capture control tables . . 47
IBMQCAP_CAPPARMS control table 47
IBMQREP_SENDQUEUES control table 49
IBMQREP_SUBS control table 50
IBMQREP_SRC_COLS control table 51
IBMQREP_SIGNAL control table 52
IBMQREP_CAPTRACE control table 53
IBMQREP_ADMINMSG control table. 53

Notices 55
Trademarks 57

Index 59

Contacting IBM 61
Product information 61

About this manual

This document is a supplement to the *DB2 UDB Replication and Event Publishing Guide*. It provides a reference for customers who are working with a replication environment and have the Q Capture program running on VSE & VM. It also provides a reference for those customers who want to use an Apply program to a database running on VSE or VM. Installation instructions can be found in the program directory for IBM DB2 DataPropagator Q Capture for VM and the program directory for IBM DB2 DataPropagator Q Capture for VSE. Installation should be performed before continuing with the Q Capture setup. Read this supplement as well as the *DB2 UDB Replication and Event Publishing Guide* before setting up replication.

Who should read this book

This book is for database administrators, data replication specialists, and others who set up and maintain a Q replication or event publishing environment. This book assumes that you are familiar with:

- Standard database terminology.
- Database design, database administration, database security, server connectivity, and networking.
- The operating systems that will be involved in your Q replication or event publishing environment.
- The data that you want to replicate or publish.
- The applications that you want to receive messages in event publishing.
- WebSphere MQ concepts and objects. (This book refers you to other sources for more detailed information about configuring and using WebSphere MQ.)

Text conventions used in this book

This book uses these highlighting conventions:

- **Boldface** type indicates commands or user interface controls such as names of fields, folders, icons, or menu choices.
- `Monospace` type indicates examples of text that you enter exactly as shown.
- *Italic* type indicates variables that you should replace with a value. It is also used to indicate book titles and to emphasize words.

Chapter 1. Introduction to DB2 DataPropagator Q Capture on VSE and VM

This document supplements the *DB2 UDB Replication and Event Publishing Guide*. It provides a reference for VSE & VM customers who work in a replication environment with the Q Capture program running on VSE or VM. It also provides a reference for those customers who want to use an Apply program with a database running on VSE or VM. Installation instructions can be found in the program directory for IBM DB2 DataPropagator Q Capture for VM and in the program directory for IBM DB2 DataPropagator Q Capture for VSE. The installation and should be performed before continuing with this setup. Please read this supplement as well as the *DB2 UDB Replication and Event Publishing Guide* before setting up replication.

DataPropagator Q Replication is a replication solution that uses WebSphere MQ message queues to transmit transactions between source and target databases. The Q Capture program on VM or VSE reads the DB2 log file for changes to the source tables that you specify.

Overview

Q Capture for VSE & VM replaces the SQL Capture product that has been previously shipped with DB2 Server for VSE & VM. The Q Capture program will read the DB2 for VSE & VM log files as the previous product did but instead of data being inserted into change data tables, transactions will be built into MQ messages and put onto the MQ message queues. The messages are read and applied to targets by the QApply program.

DB2 DataPropagator Q Capture for VM runs on a separate VM computer and the Q Capture program for VSE runs in its own partition.

Administration of replication can occur through the Replication Center.

Limitations of the DB2 DataPropagator Q Capture program

The limitations of the DB2 DataPropagator Q Capture include:

- Event publishing (storing the data in an XML format) is not supported. Only standard Q replication is supported.
- There is no support for columns created with the keyword LONG VARCHAR because there are incompatible column lengths between VSE VM and the other platforms. However, a column created up to the VARCHAR length (32 700) is supported, as long as the target column is of the same length. There are some restrictions with respect to using the Replication Center when defining the source and target columns. The Replication Center only supports column definitions up to VARCHAR(254). For columns between 254 and 32 700, the control tables must be manually populated.
- Search conditions are not supported. On the other platforms, you can specify a search condition for each subscription. Any row that does not satisfy this condition is not sent onto the queue. This capability is not supported on the VSE and VM platforms.
- Only unidirectional replication is supported.

- No monitoring capability is provided for capture on the VSE and VM platforms.

MQ environment

The MQ environment that is required to run the Capture and Apply programs differs between VM and VSE. This difference is caused by the unavailability of an MQ server on VM.

For both VM and VSE, the following MQ objects are required:

- **Queue manager** A program that manages queues for Q Capture programs, Q Apply programs, and user applications. One queue manager is required on each system. For VM, there is no queue manager, so only one queue manager is required.
- **Send queue** A queue that directs data messages from a Q Capture program to a Q Apply program or user application. In remote configurations, this is the local definition on the source system of the receive queue on the target system. Each send queue should be used by only one Q Capture program. For VM systems, the send and receive queue are the same
- **Receive queue** A queue that receives data and informational messages from a Q Capture program to a Q Apply program or user application. This queue is a local one on the target system.
- **Administration queue (for Q Capture)** A queue that receives control messages from a Q Apply program or a user application to the Q Capture program. This queue is a local one on the source system. Each administration queue should be read by only one Q Capture program.
- **Administration queue (for Q Apply)** A queue that directs control messages from the Q Apply program or user application to a Q Capture program. In remote configurations, this is the local definition on the target system of the Q Capture administration queue on the source system.
- **Restart queue** A queue that holds a single message that tells the Q Capture program where to start reading in the DB2® recovery log after the system has been restarted. This is a local queue on the source system. Each Q Capture program must have its own restart queue.
- **Spill queue** A model queue that you define on the target system to hold transaction messages from a Q Capture program while a target table is being loaded. The Q Apply program creates these dynamic queues during the loading process based on your model queue definition, and then deletes them. The spill queue must have a specific name, IBMQREP.SPILL.MODELQ.

The Q Capture and Q Apply programs must know about the WebSphere MQ objects that you create. This is done when you create the control tables, and when you create replication queue maps.

For details about the required MQ object settings for the MQ queues, refer to the *DB2 UDB Replication and Event Publishing Guide* or to page 56 of the Q Replication Guide Guide

For a VSE replication environment, the following diagram depicts the source and target systems. There is a queue manager at both ends and queues are residing at both ends.

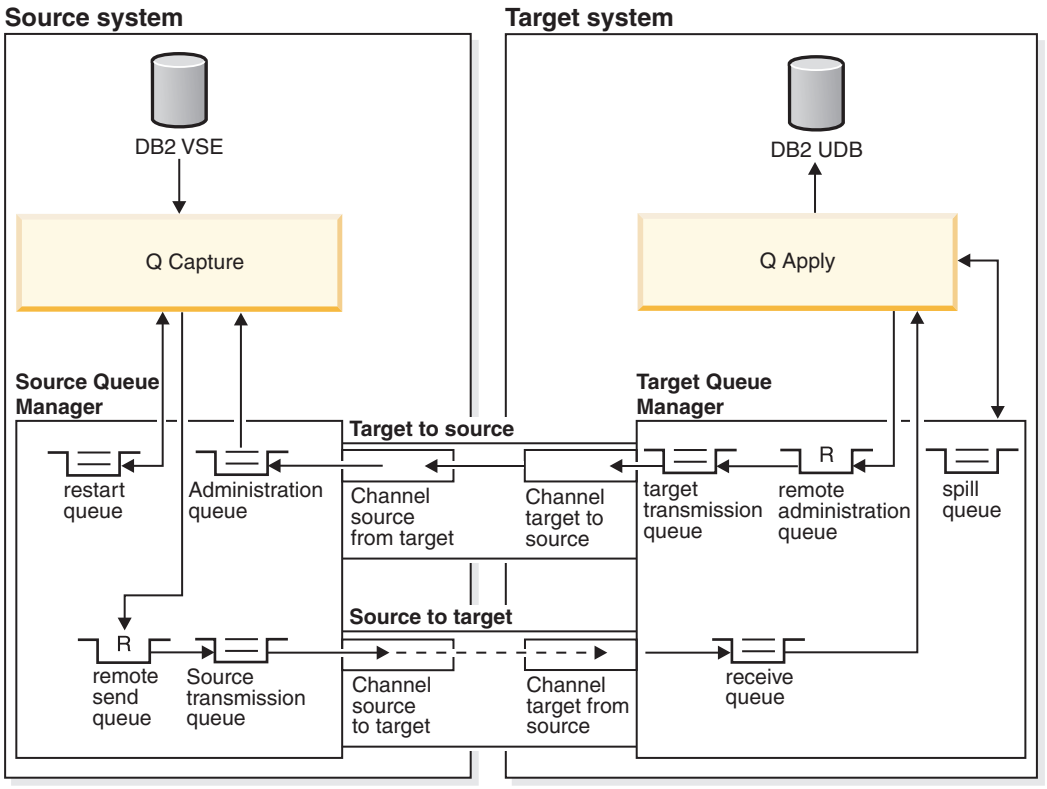


Figure 1. VSE replication environment with source and target systems

For a VM replication environment, the following diagram depicts the source and target systems. Note that there is a Q manager only on the target side and there is a two-way channel with queues residing on the target side. The receive queue is both a receive queue and a send queue.

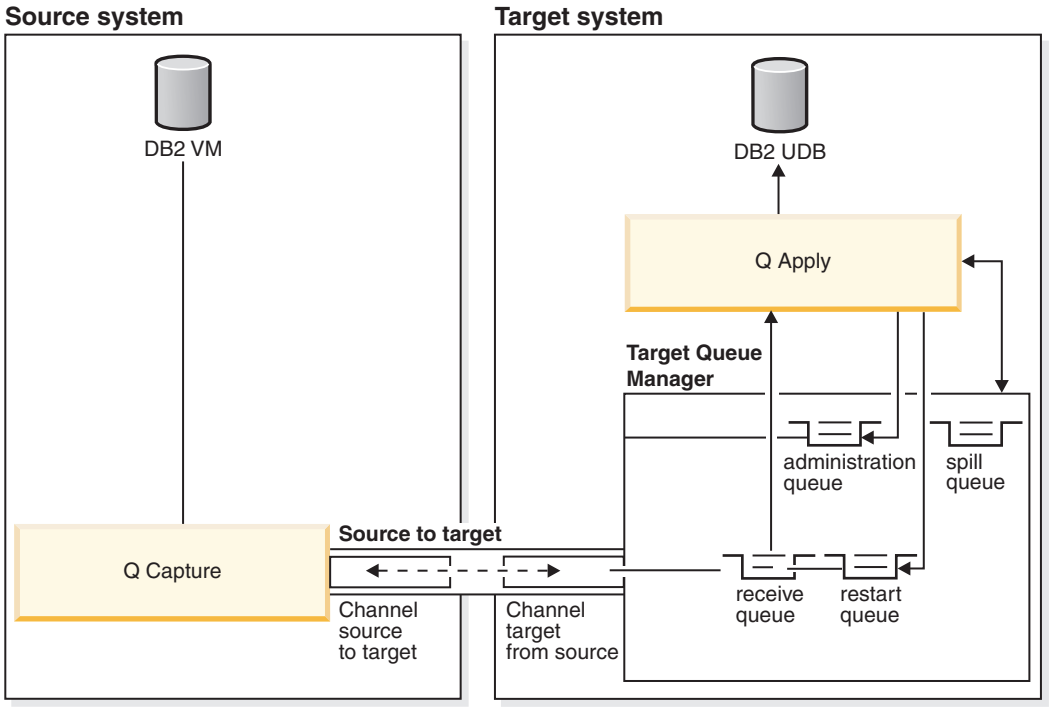


Figure 2. VM replication environment with source and target systems

Chapter 2. Setting up the Q Capture program on VM

Overview

This chapter describes the steps required to set up Q Capture on VM. The VM setup only requires one command to be executed on the VM machine and two directory statements to be updated. In addition to the VM setup, the control tables must be set up and the Q subscriptions created.

MQ setup for VM

There is only an MQ client available for VM. In order for the Q Capture program to connect to the MQ queue manager residing on another system, the following statement must be executed:

```
GLOBALV SELECT CENV SETLP MQSERVER <channel name>/TCP/<server
address(port)>
```

where:

channel name
is the name of the WebSpere MQ channel

server address
is the IP address of the MQ server that the client must connect to

port is the TCP/IP port used to communicate with the MQ server

The queues that must be created on the remote MQ Server are shown in the following list:

- **Send queue** Used as both the send and receive queues because there is no queue manager on VM. The Usage property of this queue should be set to Normal.
- **Admin queue** Used by the Q Apply program to put control messages for Q Capture. The Usage property must be set to Normal.
- **Restart queue** Used by Q Capture to read the point where it should start reading in the DB2 log. Usage must be set to Normal.

The channel that must be created is:

- **Server connection type channel (SVRCONN)**

VM setup

Q Capture on VM and VSE makes use of dataspaces to store the log records that the Capture program reads and must capture. The log records are stored in the dataspaces until an MQ Commit occurs. In order to allow the VM computer where Q Capture is running to use dataspaces, the following statements must be added to the VM directory:

XCONFIG ACCESSLIST ALSIZE *alecount*

where *alecount* is the number of dataspaces that can be accessed at one time.

XCONFIG ADDRSPACE MAXNUMBER nnnnn TOTSIZE nnnnG
authorizes the computer to create and delete up to nnnnn dataspaces where the total size of all dataspaces cannot exceed nnnnG (gigabytes)

The Q Capture program will create one dataspace at initialization, and will create additional ones as they are needed. The size of the dataspace is determined by the MEMORY_LIMIT parameter. This parameter and others are explained in more detail later.

It is up to the user to decide the maximum number and the size of dataspaces that can be created on the VM computer where Q Capture will run. This depends on the size of data that has not been committed by MQ and must be stored on the dataspace. It also depends on the number of active subscriptions.

Setting up replication from sources to targets

In addition to seting up replication on the VM computer, setup must be done from the Replication Center for unidirectional replication. This setup includes the following steps:

- Create control tables
- Create Q subscriptions

Refer to Chapter 8 and 9 of the *DB2 UDB Replication and Event Publishing Guide* for information on how to perform this setup. Keep the following items in mind:

- Event publishing is not supported.
- Search conditions to filter rows is not supported.
- The send and receive queues must be the same on VM.

Chapter 3. Setting up the Q Capture program on VSE

Overview

This chapter describes the steps required to set up Q Capture on VSE. The VSE setup is performed through the MQMT transaction which invokes MQ configuration. This chapter explains the areas of setup required for the MQ objects and communications. Setup for MQ objects includes queues, channels, and the queue manager. In addition to the VSE setup, the control tables must be set up and the Q subscriptions created.

MQ Setup for VSE

MQ VSE APAR PQ88102 is required to run Q Capture for VSE. The Q Capture program uses the MQ Series Batch Interface. Before starting the Q Capture program, the batch interface must be started. It can be configured to start automatically when MQ Series is started. The Capture JCL must contain the name of the MQ Batch Interface.

Refer to the MQ Series for VSE documentation for details on how to set up the batch interface. Some information is provided here as a guide.

The MQMT transaction is used to start MQ configuration. The following four areas must be defined:

- Queue manager:

  When defining the queue manager, the queue manager name is used to define the subscriptions when setting up replication.
- Communications:

  The TCP/IP listener port must be defined here. This port is used when configuring other MQ servers to communicate with this server.

  The Batch Interface Identifer is used when starting Q Capture for VSE and is specified in the JCL. You can set the Batch Interface auto-start field to Y to have the batch interface automatically start when MQ Series is started. If you prefer to start the batch interface manually, the MQBI transaction can be used.
- Queues:

  The following queues must be set up for unidirectional Q Capture from VSE:

  – **Local restart queue**
  (VSE system)

    The Q Capture program uses this queue to store restart information. This queue contains a single message that tells the Q Capture program where to start reading the DB2 log when Q Capture restarts. The Q Apply program does not use this queue.

    The following fields should be filled in as follows:
    Put Enabled = Y
    Get Enabled = Y

    Automatic reorganization of the VSAM file is recommended. (Automatic Reorganize=Y). To be able to enable automatic reorganization, only one queue can be defined per VSAM file.

Other fields should be set as follows:
Type=Local
Usage=N (for normal)
Triggering Enabled=N (no trigger)

- **Local administration queue**
  (VSE side)

  The Q Apply program will put messages onto its local administration queue. It is used to send control messages to the Q Capture program.

  The following fields should be filled in as follows:
  Put Enabled=Y
  Get Enabled=Y

  Automatic reorganization of the VSAM file is recommended. (Automatic Reorganize=Y). To be able to enable automatic reorganization, only one queue can be defined per VSAM file.

  Other fields should be set as follows:
  Type=Local
  Usage=N (for normal)
  Triggering Enabled=N (no trigger)

  A receive channel must be configured between the remote systems for the administration queue.

- **Remote send queue**
  (VSE side)

  The Q Capture program puts source data and informational messages onto the remote send queue to be read by the Q Apply program. A local transmission queue and a send channel are required for the messages to be transmitted to the remote target queue manager.

  The following fields must be filled in:
  Put Enabled=Y
  Get Enabled=Y or N
  Does not necessarily need to be set to Y
  Remote Queue Name = name of a local receive queue on the remote target MQ Series server.
  Remote Queue Manager Name = name of the MQ Series queue manager on the remote target server
  Transmission Queue Name = name of local transmission queue

- **Local transmission queue for the remote send queue**
  (VSE Side)

  A sender channel is required for the local transmission queue.

  The following fields must be filled in:
  Put Enabled = Y
  Default Inbound Status = A (active)
  Default Outbound Status = A (active)
  Type = Local
  Usage = T (transmission)
  Triggering section:
  Enabled = Y
  Program Id = MQPSEND
  Type = E for Every or F for First

  There are some side effects that make trigger type F seem better than E. With E, you will see messages indicating that the channel is busy frequently. This is not a problem, but it may cause confusion. These messages go away if trigger type is set to F.

Restart=Y
Channel Name = name of sender channel to the remote MQ Series server.

- **Receive queue**
  (remote system)

  This queue must be configured to a GET and/or PUT of messages. In addition, the USAGE field must be set to Normal.
- **Local transmission queue**
  (remote system)
- **Remote admin queue**
  (remote system)

Refer to Chapter 7 of the *DB2 UDB Replication and Event Publishing Guide* for details.

- Channels
  - **Receiver channel for the administration queue**
    (VSE side)

    The following fields must be filled in:
    Protocol = T (TCP/IP)
    Type=R
    Enabled=Y
    Sender information is not required
    Split Msg=N

    On the remote system a corresponding sender channel with the same name as the receiver channel must be defined.

    The connection information must match the sender channel definitions on the remote system. Pay close attention to the Message Sequence Wrap and Max Message Size. A connection will not be established if these two values do not match.
  - **Sender channel for the local transmission queue**
    (VSE side)

    The sender channel name = channel name used in the local transmission queue definition (They two must match)

    Protocol = T (TCP/IP)
    Type = S (Sender)
    Enabled = Y

    Sender data:
    Defines how to connect to the remote target MQ Series server

    The remote TCP/IP port = port number that the remote target MQ Series server is listening on.

    Note: MQ Series for VSE does not accept a port number greater than 32676.

    Transmission queue name = the local transmission queue

    Connection = IP address or host name of the remote target MQ Series server

    Split Msg = N

    A receiver channel on the remote target MQ Series server must be defined with the same name as this sender channel. The maximum message size and message sequence wrap values must be the same on both systems.
  - **Sender channel for administration queue**
    (remote system)
  - **Receiver channel for local transmission queue**
    (remote system)

Refer to Chapter 7 of the *DB2 UDB Replication and Event Publishing Guide* for details.

Setting up replication from sources to targets

In addition to setting up replication on the VSE computer, setup must be done from the Replication Center for unidirectional replication. This setup includes the following steps:

- Create control tables
- Create Q subscriptions

Refer to Chapter 8 and 9 of the *DB2 UDB Replication and Event Publishing Guide* for information on how to perform this setup. Keep the following items in mind:

- Event publishing is not supported
- Search conditions to filter rows is not supported

Chapter 4. Running the Q Capture program on VSE or VM

Overview

A Q Capture program captures transactions or row-level changes from source tables that are part of a Q subscription, then sends this transactional data as messages over WebSphere MQ queues. You can operate a Q Capture program using the **asnqcap** system command and you can change the Q Capture operating parameters in several ways.

Starting a Q Capture program

You can start a Q Capture program to capture transactions or row-level changes from the DB2 log file for active or new Q subscriptions, and to send the transactional data as messages over WebSphere MQ queues.

When you first initialize start a Q Capture program without specifying a start mode, the program uses the default start mode, warmsi. In this mode, the program tries to read the log at the point where it left off. If this is the initial time that the program is started, Q Capture switches to a cold start mode and begins processing Q subscriptions that are in N (new) or A (active) state. Any Q subscriptions that are in I (inactive) state must be activated for the program to begin capturing changes in them.

You can start a Q Capture program when no Q subscriptions are in A (active) state. When you activate the Q subscriptions, the Q Capture program begins capturing changes.

When you start a Q Capture program, you can specify startup parameter values and the program will use the new values until you take one of the following actions:

- You change the parameter values while the program is running.
- You stop and restart the program, which prompts it to read the IBMQREP_CAPPARMS table and use the values saved there.

Prerequisites

- A WebSphere MQ queue manager, queues, and other necessary objects must be created and configured on the same system as the Q Capture server, if you are running Q Capture on VSE or on a remote system or if you are running Q Capture on VM.

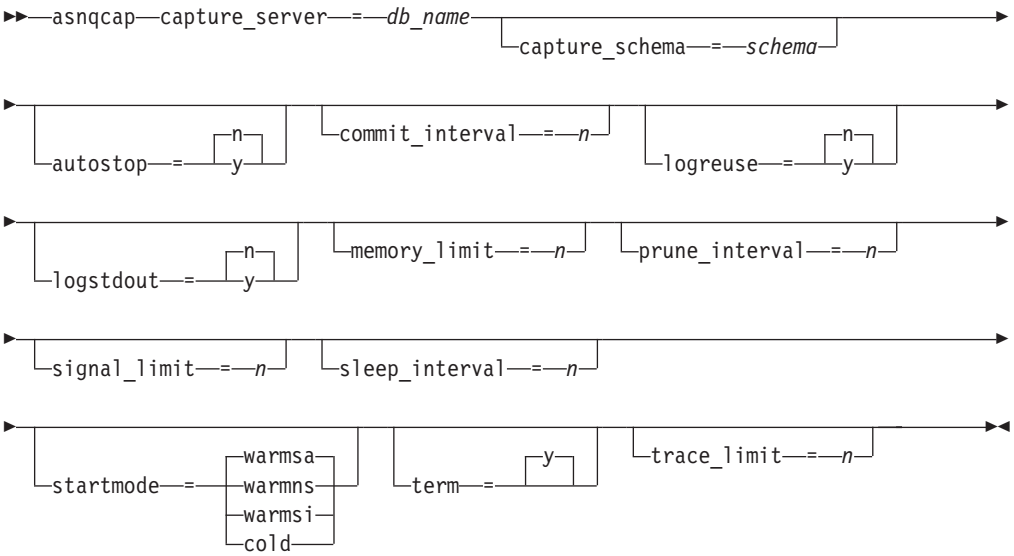
Authorizations

All users who run the Q Capture program must have SQLDBA access to the database because they must access the system catalog, access and update all control tables, update all Capture control tables, and run the Q Capture program packages.

- The control tables must be created for the appropriate Q Capture schema.
- Ensure that the data you want to capture from the source database is being logged. For example, make sure that the data is not running on non-recoverable storage pools and is not running with LOGMODE = N

Procedure

SYNTAX



VM:

asnqcap system command

Invoke the **ASNQCAP** module from a VM user ID. Keywords must be separated by one or more blanks:

```
asnqcap capture_server=server_name capture_schema=schema parameters
```

Where server_name is the name of the database or subsystem that contains the Q Capture control tables, schema identifies the Q Capture program that you want to start, and parameters is one or more parameters that you can specify at startup.

VSE:

Start the Q Capture program in a parition like a batch job. Sample job control member ASNQ74BD provides an example of how to start the Capture program in a VSE environment. You can specify ASNQCAP invocations parameters in the PARM field, separated by one or more blanks. The best method for specifying invocation parameters when using JCL is to store them in the IBMQREP_CAPPARMS table. The PARM parameter of the EXEC statement cannot have subparameters that exceed 100 characters.

To verify whether or not a Q Capture program started, use one of the following methods:

- Check the IBMQREP_CAPTRACE table for a message that indicates that the program is capturing changes.
- Examine the console for messages that indicate that the program started.

Considerations when cold starting a Q Capture program

This topic provides information that explains the issues related to starting the Q Capture program in the cold start mode.

When to cold start a Q Capture program

- When you start a Q Capture program for the first time (required).
- When you want to begin capturing changes from the end of the active log instead of from the last restart point.

Possible problems that can result from cold starts of the Q Capture program

When you cold start a Q Capture program after the Q Capture program starts initially, the Q Capture program starts reading the DB2 log from the end instead of from the last restart point. The following results can occur:

- **The source and target can become unsynchronized, which requires you to load the target**. The Q Capture program might skip over log records for data that it would otherwise have passed to the Q Apply program. If these records contain updates or inserts to the source table, the only way to synchronize the source tables with the target tables is to load the target table (sometimes called a full refresh).
- **Loading the target can cause you to lose historical data**. Historical data, which is kept when you choose to suppress deletes from the source, is a record of deleted rows in the source. The historical data is lost if the target table is loaded.
- **The load operation can take a long time**. The load operation requires significant time and effort for environments that contain many tables or large amounts of data. For these environments, the full refresh can cause costly outages, especially on production systems. Use the cold start option as a last resort except when you start a Q Capture program initially.

Preventing unexpected cold starts of the Q Capture program

To prevent an unexpected cold start:

- **Make sure that the cold start mode is not specified in the IBMQREP_CAPPARMS table**. The **startmode** parameter should not have the value *cold*.
- **Specify the warmns or warmsi start mode instead of the warmsa start mode to restart a Q Capture program whenever possible**. The Q Capture program will not cold start if the warm start information is not available.
- **Ensure that the DB2 log is large enough to avoid a log wrap before Q Capture gets to the log and avoid doing COLDLOGs of the DB2 log**. If the log has wrapped before Q Capture reads the log, Q Capture cannot continue to capture changes made to the source tables and might require a cold start. If a COLDLOG is performed, all log data is lost and a prior log archive should be taken.

Related concepts

- "Loading options" on page 33

Related tasks

- "Starting a Q Capture program" on page 11

Parameters of a Q Capture program

Parameters of a Q Capture program - overview

A Q Capture program's operating parameters govern the way that it starts, the size of the dataspaces it uses, which queue manager it connects to, and how frequently it commits messages to queues, among other things.

When you create control tables using the Replication Center, the IBMQREP_CAPPARMS table is created with a single row that contains default values for the Q Capture program's operating parameters. Table 1 shows these values. You can change the default parameter values to suit your replication environment by updating the IBMQREP_CAPPARMS table, or by temporarily overriding the saved values when you start the Q Capture program or while the program is running.

Note: You supply values for the adminq (administration queue), qmgr (queue manager), and restartq (restart queue) parameters when you create the control tables.

Table 1. Default values for the Q Capture operating parameters

Operating parameter	Default value	Column name in IBMQREP_CAPPARMS table
adminq	None [2]	ADMINQ
autostop	N [1]	AUTOSTOP
capture_schema	ASN [3]	not applicable
capture_server	not applicable [4]	not applicable
commit_interval	1000 [5]	COMMIT_INTERVAL
logreuse	N	LOGREUSE
logstdout	N	LOGSTDOUT
memory_limit	32 [6]	MEMORY_LIMIT
prune_interval	300 [7]	PRUNE_INTERVAL
qmgr	None [2]	QMGR
restartq	None [2]	RESTARTQ
signal_limit	10080 [9]	SIGNAL_LIMIT
Sleep_interval	1000 [5]	SLEEP_INTERVAL
Startmode	warmsi [10]	STARTMODE
Term	Y [8]	TERM
trace_limit	10080 [9]	TRACE_LIMIT
Userid	not applicable [11]	Not applicable

Notes:

1. No.
2. You must specify this value when you create the Q Capture control tables. This is not a command parameter. The Q Capture program reads this value from the IBMQREP_CAPPARMS table.

3. You cannot change the default schema. To use a Q Capture program with a different schema, you specify the capture_schema start parameter when you start a Q Capture program.
4. For VM and VSE, there is no default Q Capture server.
5. Milliseconds.
6. Megabytes.
7. Seconds.
8. Yes
9. Minutes.
10. The Q Capture program warm starts. It switches to cold start only if this is the first time that the program is starting.
11. The user ID and password that are used to connect to the source database. There are no default values for these parameters.

Descriptions of Q Capture parameters

The following sections describe the Q Capture program's operating parameters and discuss reasons that you might want to change the default values based.

The Q Capture program reads parameters from the IBMQREP_CAPPARMS table when you start the program. You can specify temporary run-time values for some parameters when you start the program and also while the program is running. See each parameter description for details. The following list provides the names of each of the parameters:

- "adminq"
- "autostop" on page 16
- "commit_interval" on page 16
- "logreuse" on page 17
- "logstdout" on page 17
- "memory_limit" on page 17
- "prune_interval" on page 18
- "qmgr" on page 18
- "restartq" on page 19
- "signal_limit" on page 19
- "sleep_interval" on page 19
- "startmode" on page 20
- "term" on page 21
- "trace_limit" on page 21

adminq

The **adminq** parameter defines the Q Capture administration queue. The Q Capture program uses this queue to receive control messages from the Q Apply program or a WebSphere MQ message channel agent. On VSE it is a local queue that is defined on the same system where a Q Capture program and a queue manager run. On VM, it is a queue defined on a remote system.

The administration queue must be a persistent queue, which means logging is enabled. Circular logging is recommended for this queue. Choose other attributes of this queue such as maximum depth (number of messages allowed) based on your replication.

You specify the name of an administration queue when you create the Q Capture control tables. The value is saved in the IBMQREP_CAPPARMS control table. You can change the value by updating this table. You cannot alter the value when you start a Q Capture program, or while the program is running.

autostop

Default: autostop=N The **autostop** parameter controls whether or not a Q Capture program terminates when it reaches the end of the active DB2 log. By default, a Q Capture program does not terminate after reaching the end of the log.

Typically, the Q Capture program runs as a continuous process whenever the source database is active, so in most cases you would keep the default (**autostop**=N). Set **autostop**=Y only when the Q Capture program runs at set intervals, such as when you synchronize infrequently connected systems, or in test scenarios.

If you set **autostop**=Y, the Q Capture program retrieves all eligible transactions and stops when it reaches the end of the log. You need to start the Q Capture program again to retrieve more transactions.

You can set the **autostop** parameter when you start a Q Capture program or while the program is running. You can also change the saved value of the parameter in the IBMQREP_CAPPARMS table.

commit_interval

Default: commit_interval=1000 milliseconds The **commit_interval** parameter specifies how often, in milliseconds, a Q Capture program commits transactions to WebSphere MQ. By default, a Q Capture program waits 500 milliseconds (a half second) between commits. At each interval, the Q Capture program issues an MQCMIT call. This call signals the WebSphere MQ queue manager to make messages that were placed on send queues available to the Q Apply program or other user applications.

All of the DB2 transactions that are grouped within an MQCMIT call are considered to be a WebSphere MQ unit of work, or transaction. Typically, each WebSphere MQ transaction contains several DB2 transactions. If a particular DB2 transaction is large, the Q Capture program will not issue an MQCMIT call even if the commit interval is reached. The Q Capture program will commit only after the entire large DB2 transaction is put on the send queue.

When the number of committed DB2 transactions that are read by a Q Capture program reaches 128, the program issues an MQCMIT call regardless of your setting for **commit_interval**.

Finding the best commit interval is a compromise between latency (the delay between the time transactions are committed at the source and target databases) and CPU overhead associated with the commit process:

- To reduce latency, shorten the commit interval.

  Transactions will be pushed through with less delay if the commit interval is shortened. This timely action is especially important if changes to the source database are used to trigger events. To judge whether you can reduce latency by shortening the commit interval, determine if a Q Capture program's idle time after processing all transactions is high (check the CAPTURE_IDLE value in the IBMQREP_CAPMON control table). Also, if the number of transactions

published per commit interval is high (check the TRANS_PUBLISHED value in the IBMQREP_CAPQMON table), you might want to the Q Capture program to commit fewer transactions at a time to WebSphere MQ (see "Procedure for determining transactions published per commit interval").

- To reduce CPU overhead, lengthen the commit interval.

  A longer commit interval lets you send as many DB2 transactions as possible for each WebSphere MQ transaction. A longer commit interval also reduces I/O that is caused by logging messages. If you lengthen the commit interval, you might be limited by the maximum depth (number of messages) for send queues, and the queue manager's maximum uncommitted messages (MAXUMSGS) attribute. If a Q Capture program waits longer between commits, the publication of some transactions might be delayed, which could increase latency.

You can set the **commit_interval** parameter when you start a Q Capture program or while the program is running. You can also change the saved value of the parameter in the IBMQREP_CAPPARMS table.

logreuse

Default: logreuse=N Each Q Capture program keeps a log file that tracks its work history, such as start and stop times, parameter changes, errors, pruning, and the points where it stopped while reading the DB2 log.

By default, the Q Capture program adds the time when the program restarts to the existing log file. This default lets you keep a history of the program's actions. If you don't want this history or want to save space, set logreuse=Y. The Q Capture program clears the log file when it starts, then writes to the blank file.

You can set the **logreuse** parameter when you start a Q Capture program or while the program is running. You can also change the saved value of the parameter in the IBMQREP_CAPPARMS table. In VM the filename is determined by the FILEDEF that the user set up for ASNQLOG. The file does not exist on VSE and the parameter is ignored in VSE.

logstdout

Default: logstdout=N By default, a Q Capture program writes its work history only to the log file. You can change the **logstdout** parameter if you want to see the program's history on the standard output (stdout) and in the log file. The recommended value for **logstdout** is Y for VSE & VM.

Error messages and some log messages (initialization, stop, subscription activation, and subscription deactivation) go to both the standard output and the log file regardless of the setting for this parameter.

You can set the **logstdout** parameter when you start a Q Capture program with the **asnqcap** command, or while the program is running by using the **chgparms operator command** command. You can also change the saved value of the parameter by updating the IBMQREP_CAPPARMS table. If you use the Replication Center to start the Q Capture program, this parameter is not applicable.

memory_limit

Default: memory_limit=32 MB The **memory_limit** parameter specifies the size of the dataspace that will be created and that the Q Capture program will use to build DB2 transactions as the DB2 log file is read. By default, a Q Capture program

creates a 32MB dataspace. When the dataspace allocated by this parameter is filled up and no new transactions can be stored on it, the Q Capture program will create another dataspace of the same size.

You can adjust the memory limit based on your needs:

- To improve the performance of a Q Capture program, increase the memory limit.

  If your goal is to obtain higher throughput, maximize the memory limit whenever possible.
- To conserve system resources, lower the memory limit.

  A lower memory limit reduces competition with other system operations.

You can set the **memory_limit** parameter when you start a Q Capture program or while the program is running. You can also change the saved value of the parameter in the IBMQREP_CAPPARMS table.

prune_interval

Default: prune_interval=300 seconds (5 minutes) The **prune_interval** parameter determines how often a Q Capture program looks for eligible rows to prune from the IBMQREP_CAPMON, IBMQREP_CAPQMON, IBMQREP_SIGNAL, and IBMQREP_CAPTRACE tables. By default, a Q Capture program looks for rows to prune every 300 seconds (5 minutes). The recommended value for VSE & VM is the maximum value of 3600 seconds.

Your pruning frequency depends on how quickly these control tables grow, and what you intend to use them for:

- Lengthen the prune interval for record keeping.

  You might want to keep a longer history of a Q Capture program's performance by pruning the IBMQREP_CAPTRACE and other tables less frequently.

The prune interval works in conjunction with the **trace_limit** and **signal_limit** parameters, which determine when data is old enough to prune. For example, if the **prune_interval** is 300 seconds and the **trace_limit** is 10080 seconds, a Q Capture program will try to prune every 300 seconds. If the Q Capture program finds any rows in the IBMQREP_CAPTRACE table that are older than 10080 minutes (7 days), it prunes them.

You can set the **prune_interval** parameter when you start a Q Capture program or while the program is running. You can also change the saved value of the parameter in the IBMQREP_CAPPARMS table.

qmgr

The **qmgr** parameter specifies the name of the WebSphere MQ queue manager that a Q Capture program uses. The queue manager's job is to manage queues and messages for the Q Capture program. It must run on the same system as the Q Capture program. Although client connections to queue managers are supported by WebSphere MQ, this configuration is not supported for Q Capture.

The queue manager owns the queues that a Q Capture program uses to send data and informational messages, and to receive control messages. All communication between Q replication and WebSphere MQ goes through queue managers.

You specify the name of a queue manager when you create the Q Capture control tables. The value is saved in the IBMQREP_CAPPARMS control table. You can change the value by updating this table. You cannot alter the value when you start a Q Capture program, or while the program is running.

restartq

The **restartq** parameter specifies the restart queue that you want the Q Capture program to use. The restart queue contains a single message that tells a Q Capture program where to start reading in the DB2 log file after the Q Capture program restarts. It is a local queue that is defined on the same system as the Q Capture program and queue manager run. You must supply the name of this queue when you create the Q Capture control tables, and a Q Capture program must be able to connect to this queue to run.

The restart queue must be a persistent queue, which means logging is enabled. Circular logging is recommended for this queue. Choose other attributes of this queue based on your replication.

You specify the name of a restart queue when you create the Q Capture control tables. The value is saved in the IBMQREP_CAPPARMS control table. You can change the value by updating this table. You cannot alter the value when you start a Q Capture program, or while the program is running.

signal_limit

Default: signal_limit=10080 minutes (7 days) The **signal_limit** parameter specifies how long rows remain in the IBMQREP_SIGNAL table before they can be pruned.

By default, a Q Capture program prunes rows that are older than 10080 minutes (7 days) at each pruning interval.

The IBMQREP_SIGNAL table contains signals inserted by a user or a user application. It also contains corresponding signals that are inserted by a Q Capture program after it receives control messages from the Q Apply program or a user application. The Q Capture program sees the signals when it reads the log record for the insertion into the IBMQREP_SIGNAL table.

These signals tell a Q Capture program to stop running, to activate or deactivate a Q subscription, to ignore a DB2 transaction in the log, or to invalidate a send queue. In addition, the LOADDONE signal tells a Q Capture program that a target table is loaded.

You can adjust the signal limit depending on your environment.

Lengthen the limit to use this table for record-keeping purposes.

You can set the **signal_limit** parameter when you start a Q Capture program or while the program is running. You can also change the saved value of the parameter in the IBMQREP_CAPPARMS table.

sleep_interval

Default: sleep_interval=1000 milliseconds (1 seconds) The **sleep_interval** parameter specifies the number of milliseconds that a Q Capture program waits after reaching the end of the active log file and assembling any transactions that remain in memory.

By default, a Q Capture program sleeps for 1000 milliseconds (1 second). After this interval, the program starts reading the log file again. You can adjust the sleep interval based on your environment:

- Lower the sleep interval to reduce latency.

  A smaller sleep interval can improve performance by lowering latency (the time that it takes for a transaction to go from source to target), by reducing idle time, and by increasing throughput in a high-volume transaction environment.
- **Increase the sleep interval to save resources**.

  A larger sleep interval gives you potential CPU savings in an environment where the source database has low traffic or where targets do not need frequent updates.

You can set the **sleep_interval** parameter when you start a Q Capture program or while the program is running. You can also change the saved value of the parameter in the IBMQREP_CAPPARMS table.

startmode

Default: startmode=warmsi The **startmode** parameter specifies the steps that a Q Capture program takes when it starts. The program starts in either warm or cold mode. With a warm start, the Q Capture program continues capturing changes where it left off after its last run (there are three types of warm start). If you choose cold start, the program starts reading at the end of the log file. Choose from one of the four start modes, depending on your environment:

cold start mode

The Q Capture program clears the restart and administration queues, and starts processing all Q subscriptions that are in N (new) or A (active) state. With a cold start, the Q Capture program starts reading the DB2 recovery log file at the end.

Generally, use a cold start only the first time that you start a Q Capture program. You can use a cold startafter the first time that you start a Q Capture program, if you want to begin capturing changes from the end of the active log file instead of from the last restart point. You cannot use a cold start to force a full refresh (a new load) of targets. The only way to force a full refresh is to deactivate and then activate a Q subscription that has a load phase.

Important: To avoid unwanted cold starts, be sure that this start mode is not specified in the IBMQREP_CAPPARMS table.

warmsi (warm start; that switches to cold start on initial program start) start mode
The Q Capture program starts reading the log file at the point where it left off, unless this is the first time that you are starting the program. In that case, the Q Capture program switches to a cold start. The **warmsi** start mode ensures that a Q Capture program cold starts only during its initial startups. Warmsi is the recommended start mode.

warmns (warm start; never switch to cold start) start mode
The Q Capture program starts reading the log file at the point where it left off. If the program cannot warm start, it does not switch to cold start. Use this start mode to prevent a Q Capture program from cold starting unexpectedly. This start mode allows you to repair problems (such as unavailable databases or table spaces) that prevent a warm start. With **warmns**, if a Q Capture program cannot warm start, it shuts down and leaves all tables intact.

warmsa (warm start if possible; if not, cold start) start mode
If warm start information is available, the Q Capture program starts reading the log file at the point where it left off. If the Q Capture program cannot warm start, it switches to a cold start.

During warm starts, the Q Capture program only loads those Q subscriptions that are in not in I (inactive) state.

You can set the **startmode** parameter when you start a Q Capture program, or you can change the saved value of the parameter in the IBMQREP_CAPPARMS table. You cannot alter this parameter while a Q Capture program is running.

term

Default: term=Y Q Capture for VSE and VM only supports term=Y. term=N cannot be specified. This means that a Q Capture program automatically stops when DB2 stops or has forced all applications to disconnect.

trace_limit

Default: trace_limit=10080 minutes (7 days) The **trace_limit** parameter specifies how long rows remain in the IBMQREP_CAPTRACE table before they can be pruned.

The Q Capture program inserts all informational, warning, and error messages into the IBMQREP_CAPTRACE table. By default, rows that are older than 10080 minutes (7 days) are pruned at each pruning interval. Modify the trace limit depending on your need for audit information.

You can set the **trace_limit** parameter when you start a Q Capture program or while the program is running. You can also change the saved value of the parameter in the IBMQREP_CAPPARMS table.

Changing the Q Capture parameters

Changing the Q Capture parameters - overview

You can change the Q Capture program's operating parameters when you start the program, while the program is running, or by updating the IBMQREP_CAPPARMS control table.

Methods of changing the Q Capture operating parameters

This topic provides a brief description of the three different ways that you can change the parameters, followed by an example to help clarify the differences.

Changing saved parameters in the IBMQREP_CAPPARMS table

The Q Capture program's operating parameters are saved in the IBMQREP_CAPPARMS control table. After installation, this table is filled with the shipped default values for the program. A Q Capture program reads the table when it starts. You can change the parameter values when you start the Q Capture program or while it is running, but these changes stay only in memory. When you stop and restart the Q Capture program, it will use the parameter values that are saved in the IBMQREP_CAPPARMS table. You can update this table by using SQL.

Setting parameter values at startup

When you start a Q Capture program, you can override the parameter values that are saved in the IBMQREP_CAPPARMS table. You can use the **asnqcap** system command to set values for the operating parameters. Your changes take effect when the program starts, but they will last only while the program is running.

Dynamically changing parameters while a Q Capture program is running

You can dynamically change a Q Capture program's parameter values while continuing to capture changes from the source. Use the CHGPARMS command to change values while a Q Capture program is running. Your changes will last only until the program stops running, or until the next change-parameters request.

Example: Three ways to change Q Capture operating parameters

Assume that you want to increase the default setting for the commit interval of 1000 milliseconds for a Q Capture program identified by schema ASN1:

1. Update the IBMQREP_CAPPARMS table for Q Capture schema ASN1. Set the commit interval to 1500 milliseconds(1.5 seconds). You can use the following SQL: update asn1.ibmqrep_capparms set commit_interval=1500.

   When you start this Q Capture program in the future, the commit interval will default to 1500 milliseconds.
2. You want to see the effect of an even longer commit interval on replication throughput (the number of transactions published for a given period of time). Rather than change the saved value in the control table, you start the Q Capture program with the commit interval set to 2000 milliseconds (2 seconds). You can use **asnqcap** command:
   asnqcap capture_server=srcdb1 capture_schema="ASN1" commit_interval=2000

   While the program runs using a 2-second commit interval, you monitor its performance.
3. Based on performance, you decide to lower the commit_interval. Instead of stopping the Q Capture program, you dynamically change the parameter while the program is running to 1750 milliseconds, and monitor the change. You can use the CHGPARMS command:
   CHGPARMS commit_interval=1750

   You can continue to tune the commit interval parameter using the CHGPARMS command. When you find the value that meets your requirements, you can update the IBMQREP_CAPPARMS table (as described in step 1). The next time you start a Q Capture program, it uses the new value as the default commit interval.

Activating Q subscriptions

Before the Q Capture program can start replicating or publishing data from source tables, the Q subscriptions that specify those source tables must be in A (active) or N (new) state.

By default, newly created Q subscriptions are in N (new) state, and they are automatically activated when the Q Capture program is started or reinitialized. If you change this default, you must activate Q subscriptions after you create them.

When Q subscriptions are activated, the Q Capture program starts capturing source table changes and sending those changes through the WebSphere MQ queues that you defined in a replication queue map.

Prerequisites:

- The Q Capture program must be running to read the CAPSTART signal or activate subscription message. If the Q Capture program is stopped when you activate Q subscriptions, it will process the signal or message only if it is warm started. The signal or message will be lost if you use cold start.

Procedure:

You can use the Replication Center or SQL to activate Q subscriptions.

Replication Center

Use the Manage Q Subscriptions window to activate a Q subscription. To open the window, right-click the Q Capture server where the source table for the Q subscription is located and select **Manage -_ Q Subscriptions**.

SQL

Use a command prompt or one of the DB2 command line tools to insert a CAPSTART signal into the IBMQREP_SIGNAL table at the Q Capture server:

```
insert into schema.IBMQREP_SIGNAL(
      SIGNAL_TIME,
      SIGNAL_TYPE,
      SIGNAL_SUBTYPE,
      SIGNAL_INPUT_IN,
      SIGNAL_STATE )
values (
      CURRENT TIMESTAMP,
      'CMD',
      'CAPSTART',
      'subname',
      'P' );
```

Where schema identifies a Q Capture program and subname is the name of the Q subscription that you want to activate.

Deactivating Q subscriptions

You deactivate a Q subscription to instruct the Q Capture program to stop capturing changes for the Q subscription. Deactivating lets you delete or suspend activity for Q subscriptions without stopping the Q Capture program.

You can deactivate a Q subscription using the Replication Center or by inserting a SQL signal into the IBMQREP_SIGNAL table. The Q Capture program stops capturing changes for the Q subscription and changes its state to I (inactive) in the IBMQREP_SUBS table.

Prerequisites:

The Q Capture program must be running to read the CAPSTOP signal. If the Q Capture program is stopped when you deactivate a Q subscription, it will process the signal only if it is warm started. The signal will be lost if you use cold start.

Procedure:

You can use the Replication Center or SQL to deactivate Q subscriptions:

Replication Center

Use the Manage Q Subscriptions window to deactivate a Q subscription. To open the window, right-click the Q Capture server where the source table for the Q subscription is located and select **Manage -_ Q Subscriptions**.

SQL

Use a command prompt or one of the DB2 command line tools to insert a CAPSTOP signal into the IBMQREP_SIGNAL table at the Q Capture server:

```
insert into schema.IBMQREP_SIGNAL (
      SIGNAL_TIME,
      SIGNAL_TYPE,
      SIGNAL_SUBTYPE,
      SIGNAL_INPUT_IN,
      SIGNAL_STATE )
values (
      CURRENT TIMESTAMP,
      'CMD',
      'CAPSTOP',
      'subname',
      'P' );
```

Where *schema* identifies a Q Capture program and *subname* is the name of the Q subscription that you want to deactivate.

Stopping a Q Capture program

You can stop a Q Capture program, and it will stop reading from the DB2 log file and building transactions in memory. Messages that were put on queues will be committed to WebSphere MQ before the Q Capture program stops. Uncommitted WebSphere MQ transactions or row changes that were in memory when you stopped the program will be recaptured from the log file when the Q Capture program restarts, based on a restart point stored in the restart message.

Tip: You do not need to stop a Q Capture program to add or delete a Q subscription.

- If you want to add one or two Q subscriptions while the program is running, create the Q subscriptions so that they do not start automatically, and then activate them.
- If you want to add a large number of Q subscriptions, create them so that they start automatically, and then reinitialize the Q Capture program.
- You can delete a Q subscription without stopping the Q Capture program by deactivating the Q subscription and then deleting it.

Prerequisites:

The Q Capture program that you want to stop must be running.

Procedure:

Use one of the following methods to stop a Q Capture program:

Stop Q Capture Program. stop operator command

Use the **STOP** operator command on the console to stop a Q Capture program

SQL

Use a command prompt or one of the DB2 command line tools to insert a STOP signal into the IBMQREP_SIGNAL table at the Q Capture server:

```
insert into schema.IBMQREP_SIGNAL(
 SIGNAL_TIME,
 SIGNAL_TYPE,
 SIGNAL_SUBTYPE,
 SIGNAL_INPUT_IN,
 SIGNAL_STATE )
values (
 CURRENT TIMESTAMP,
 'CMD',
 'STOP',
 'NULL',
 'P' );
```

Where *schema* identifies the Q Capture program that you want to stop.

Operator commands

You can use operator commands to control the following behaviors of the Q Capture program:

- **STOP**: Stop a Q Capture program
- **REINIT**: Reinitialize a Q Capture program
- **REINITQ**: Reinitialize a send queue
- **QRYPARMS/CHGPARMS**: Query and change parameter values while a Q Capture program is running
- **PRUNE**: Prune control tables
- **STATUS**: Show status of a Q Capture program

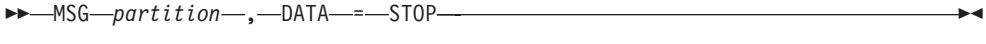
Command - STOP

- Use the STOP command to stop the Q Capture program in an orderly way and commit the messages that it processed up to that point.

  To stop the Capture program for VM:

  To stop the Capture program for VSE:

  The following text shows an example output:

  ```
  STOP
  2004-06-11-15.24.47 ASN0548I "MQCAP" : "ASN" : The program received an
  operator stop command.
  DASD 0300 DETACHED
  DASD 0301 DETACHED
  ```

```
DASD 0302 DETACHED
2004-06-11-15.53.18 ASN0573I "MQCAP" : "ASN" : The program was stopped.
```

Command - REINIT

- The REINIT command reinitializes the Q Capture program.

To reinitialize the Q Capture program for VM:

To reinitialize the Q Capture program for VSE:

- Use the REINIT command to have a Q Capture program deactivate and then activate all Q subscriptions using the latest values in the IBMQREP_SUBS, IBMQREP_SRC_COLS, and IBMQREP_SENDQUEUES tables. This command allows you to change some attributes for multiple Q subscriptions while a Q Capture program is running. This command will not prompt a new load of targets.

  The following text shows an example output:

  ```
  REINIT
  2004-06-11-15.25.34 ASN7008I "MQCAP" : "ASN" : The program was
  successfully reinitialized. "1" subscriptions are active. "0"
  subscriptions are inactive. "0" subscriptions that were new were
  successfully activated. "0" subscriptions that were new could not be
  activated and are now inactive.
  ```

Command - REINITQ

- The REINITQ command obtains the latest settings from the IBMQREP_SENDQUEUES table.
- Use the REINITQ command to have a Q Capture program refresh one send queue using the latest attributes from the IBMQREP_SENDQUEUES table. This command affects all Q subscriptions that use this send queue. Only the following attributes will be refreshed: ERROR_ACTION, HEARTBEAT_INTERVAL, MAX_MESSAGE_SIZE.

To re-initialize Q Capture program for VM:

To re-initialize Q Capture program for VSE:

To change attributes of replication queue maps without stopping replication

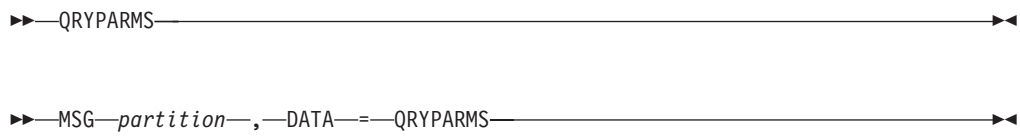
1. Change the properties of the queue map.
2. Issue REINITQ to pick up the changes.

The following text shows an example output:

```
REINITQ YPVMDATA
2004-06-11-15.31.43 ASN7046I "MQCAP" : "ASN" : Send queue "YPVMDATA" of
replication queue map "YPVMDATAMAP" was successfully reinitialized. The
following attributes were refreshed: ERROR_ACTION is "I",
HEARTBEAT_INTERVAL is "1", MAX_MESSAGE_SIZE is "65536".
```

Command - QRYPARMS

Use the QRYPARMS command if you want to query the current operational parameter values for a Q Capture program. They will be written to the console.



The following text shows an example output:

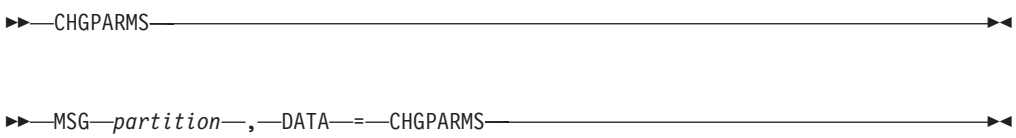
```
QRYPARMS
2004-06-11-15.34.32 ASN0521I "MQCAP" : "ASN" : The QRYPARMS command
response: "CAPTURE_SERVER" was set to "SQLMACYD" by the following method:
"COMMANDLINE".

2004-06-11-15.34.32 ASN0521I "MQCAP" : "ASN" : The QRYPARMS command
response: "DEBUG" was set to "N" by the following method: "CHGPARMS
COMMAND".

2004-06-11-15.34.32 ASN0521I "MQCAP" : "ASN" : The QRYPARMS command
response: "CAPTURE_SCHEMA" was set to "ASN" by the following method:
"DEFAULT".

2004-06-11-15.34.32 ASN0521I "MQCAP" : "ASN" : The QRYPARMS command
response: "LOGREUSE" was set to "N" by the following method: "PARAMETERS
TABLE".

2004-06-11-15.34.32 ASN0521I "MQCAP" : "ASN" : The QRYPARMS command
response: "LOGSTDOUT" was set to "Y" by the following method: "COMMANDLINE".

2004-06-11-15.34.32 ASN0521I "MQCAP" : "ASN" : The QRYPARMS command
response: "TERM" was set to "Y" by the following method: "DEFAULT".
```

Command - CHGPARMS

Use the CHGPARMS command to change one or more of the operational parameters of a Q Capture program while it is running:

- autostop
- commit_interval
- logreuse
- logstdout
- memory_limit
- prune_interval
- signal_limit
- sleep_interval
- trace_limit

You can specify multiple parameters in one CHGPARMS command, and you can change these parameter values as often as you want. The changes temporarily override the values in the IBMQREP_CAPPARMS table, but they are not written to the table. When you stop and restart the Q Capture program, it uses the values in IBMQREP_CAPPARMS. Starting a Q Capture program includes descriptions of the parameters that you can override with this command.



The following text shows an example output:

```
CHGPARMS COMMIT_INTERVAL=60000
2004-06-11-15.37.49 ASN0523I "MQCAP" : "ASN" : The CHGPARMS command
response:COMMIT_INTERVAL" has been set to "60000".
```

Command - PRUNE

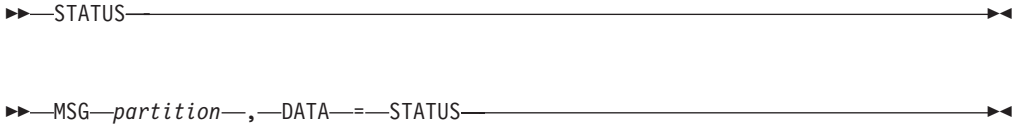
Use the PRUNE command to instruct a Q Capture program to prune the IBMQREP_CAPTRACE and IBMQREP_SIGNAL tables. This pruning is in addition to any regularly scheduled pruning that is specified by the prune_interval parameter.

The following text shows an example output:

```
PRUNE
2004-06-11-15.32.04 ASN0111I "MQCAP" : "ASN" : The pruning cycle has started
at "2004-06-11-15.32.04".

2004-06-11-15.32.04 ASN0567I "MQCAP" : "ASN" : "10" rows were pruned from
table "IBMQREP_SIGNAL".

2004-06-11-15.32.04 ASN0567I "MQCAP" : "ASN" : "0" rows were pruned from
table "IBMQREP_CAPTRACE".

2004-06-11-15.32.04 ASN0112I "MQCAP" : "ASN" : The pruning cycle has ended
at "2004-06-11-15.32.04".
```

Command - STATUS

Use the STATUS command to shows various operational values.



The following text shows an example output:

```
status
STATUS: Prune interval expires in 290 seconds.
STATUS: Number of Dataspaces = 1
STATUS: Current Dataspace = 0
STATUS: Dataspace size = 33554432 bytes
STATUS: Dataspace name = 'IBMQREP_DATASPACE_0
STATUS: Restart Commit Sequence Number = 40ca:0f2d:0000:0000:0000
STATUS: Last committed transaction = 40ca:0f2d:0000:0000:0000
STATUS: Maximum transaction size = 0 bytes
status
STATUS: Prune interval expires in 194 seconds
STATUS: Number of Dataspaces = 1
STATUS: Current Dataspace = 0
STATUS: Dataspace size = 33554432 bytes
STATUS: Dataspace name = 'IBMQREP_DATASPACE_0
STATUS: Restart Commit Sequence Number = 40ca:0f2d:0000:0000:0000
STATUS: Last committed transaction = 40ca:0f8e:0000:0000:0000
STATUS: Maximum transaction size = 125 bytes
```

The STATUS command output values have these meanings:

Prune interval expiration
The number of seconds after which a pruning will occur. The prune interval is defined by a user at Q Capture startup time by the prune_interval parameter.

Number of Dataspaces
The number of dataspaces that have been created by the Q Capture program and are being used by it to store the transactions and build the messages.

Current Dataspace
The number of the dataspace that the Q Capture program is currently writing to. This is an internally defined number which starts at 0.

Dataspace Size
The size of the dataspace that will be created by the Q Capture program. This is defined by the user at Q Capture startup time by the memory_limit parameter.

Dataspace Name
The name of the dataspace that the Q Capture program is currently writing to. This is an internally defined name.

Restart Commit Sequence
This is the internal sequence number from which the Q Capture program will start capturing, upon a warm start.

Last Committed Transaction
This is the internal sequence number of the last committed transaction.

Maximum transaction size
This is current the size of the largest DB2 transaction so far.

Signals

Users can insert the following SQL signals manually or through the Replication Center:

- CAPSTART: Request that the Q Capture program activate a Q subscription and start capturing changes.
- CAPSTOP: Request that the Q Capture program deactivate a Q subscription and stop capturing changes.
- LOADDONE: Notify the Q Capture program that the manual load of the target table is complete. (The Q Apply program can also insert a LOADDONE signal in the case of an automatic load).
- REINIT_SUB: Request that the Q Capture program deactivate and then activate one Q subscription using the latest values in the IBMQREP_SUBS, IBMQREP_SRC_COLS, and IBMQREP_SENDQUEUES tables. This signal will not prompt a new load of targets.

Users can insert the following SQL signals manually:

- QINERROR: Execute the error action defined for the send queue in the IBMQREP_SENDQUEUES table.
- STOP: Stop capturing changes and terminate the Q Capture program
- IGNORETRANS: Ignore the DB2 transaction that contains this signal

Signals - CAPSTOP

The CAPSTOP signal deactivates a subscription. No more changes will be captured.

Execute the following SQL statement to send a CAPSTOP signal.

```
INSERT INTO ASN.IBMQREP_SIGNAL(
 SIGNAL_TIME,
 SIGNAL_TYPE,
 SIGNAL_SUBTYPE,
 SIGNAL_INPUT_IN,
 SIGNAL_STATE )
VALUES (
 CURRENT TIMESTAMP,
 'CMD',
 'CAPSTOP',
 'MQCAPTURE_TEST4',
 'P');
```

The following text shows an example output:

```
2004-06-11-15.27.20 ASN7019I "MQCAP" : "ASN" : "CAPSTOP" signal was received
and will be processed.
2004-06-11-15.27.20 ASN7013I "MQCAP" : "ASN" : The Q subscription
"MQCAPTURE_TEST4" was deactivated.
```

Signals - CAPSTART

The CAPSTART signal activates a subscription. Changes to the subscribed table will be captured.

Execute the following SQL statement to send a CAPSTART signal.

```
INSERT INTO ASN.IBMQREP_SIGNAL(
 SIGNAL_TIME,
 SIGNAL_TYPE,
 SIGNAL_SUBTYPE,
 SIGNAL_INPUT_IN,
 SIGNAL_STATE )
VALUES (
 CURRENT TIMESTAMP,
```

```
 'CMD',
 'CAPSTART',
 'MQCAPTURE_TEST4',
 'P');
```

The following text shows an example output:

```
2004-06-11-15.29.42 ASN7019I "MQCAP" : "ASN" : "CAPSTOP" signal was received
and will be processed.
2004-06-11-15.29.42 ASN7013I "MQCAP" : "ASN" : The Q subscription
"MQCAPTURE_TEST4" was deactivated.

<CAPSTART signal is issued>

2004-06-11-15.29.52 ASN7019I "MQCAP" : "ASN" : "CAPSTART" signal was
received and will be processed.

2004-06-11-15.29.53 ASN7017I "MQCAP" : "ASN" : The target table
"FVT1.MQ_TEST4" is ready to be loaded from source table "SQLDBA.MQ_TEST4"
for Q subscription "MQCAPTURE_TEST4".
```

Signals - REINIT_SUB

Use the REINIT_SUB signal to pick up the of attribute changes for a single Q subscription without stopping replication.

Execute the following SQL statement to send a REINIT_SUB signal.

```
INSERT INTO ASN.IBMQREP_SIGNAL(
 SIGNAL_TIME,
 SIGNAL_TYPE,
 SIGNAL_SUBTYPE,
 SIGNAL_INPUT_IN,
 SIGNAL_STATE )
VALUES (
 CURRENT TIMESTAMP,
 'CMD',
 'REINIT_SUB',
 'MQCAPTURE_TEST4',
 'P');
COMMIT;
```

The following text shows an example output:

```
2004-06-11-15.30.29 ASN7019I "MQCAP" : "ASN" : "REINIT_SUB" signal was
received and will be processed.

2004-06-11-15.30.29 ASN7012I "MQCAP" : "ASN" : The Q subscription
"MQCAPTURE_TEST4" was successfully reinitialized.
```

Signals - LOADDONE

Use the LOADDONE signal to tell a Q Capture program that a target table is loaded.

Execute the following SQL statement to send a LOADDONE signal.

```
INSERT INTO ASN.IBMQREP_SIGNAL(
 SIGNAL_TIME,
 SIGNAL_TYPE,
 SIGNAL_SUBTYPE,
 SIGNAL_INPUT_IN,
```

```
 SIGNAL_STATE )
VALUES (
 CURRENT TIMESTAMP,
 'CMD',
 'LOADDONE',
 'MQCAPTURE_TEST4',
 'P');
COMMIT;
```

The following text shows an example output:

```
2004-06-11-15.52.26 ASN7019I "MQCAP" : "ASN" : "LOADDONE" signal was
received and will be processed.

2004-06-11-15.52.26 ASN7010I "MQCAP" : "ASN" : The program successfully
activated Q subscription "MQCAPTURE_TEST4" (send queue "YPVMDATA",
replication queue map "YPVMDATAMAP") for source table "SQLDBA.MQ_TEST4".
```

Signals - QINERROR

The QINERROR signal deactivates sendq and executes the qerror action specified for the sendq.

Execute the following SQL statement to send a QINERROR signal.

```
INSERT INTO ASN.IBMQREP_SIGNAL(
 SIGNAL_TIME,
 SIGNAL_TYPE,
 SIGNAL_SUBTYPE,
 SIGNAL_INPUT_IN,
 SIGNAL_STATE )
VALUES (
 CURRENT TIMESTAMP,
 'CMD',
 'QINERROR',
 'YPVMDATA',
 'P');
```

The following text shows an example output:

```
2004-06-12-21.26.45 ASN7019I "MQCAP" : "ASN" : "QINERROR" signal was
received and will be processed.

2004-06-12-21.26.45 ASN7015E "MQCAP" : "ASN" : The program detected an
unrecoverable WebSphere MQ error for send queue "YPVMDATA" of replication
queue map "YPVMDATAMAP". The error action specified for the queue map is
"I".

2004-06-12-21.26.45 ASN8001D "N/A" : "ASN" : Unexpected return code "6029"
from routine "queueInError".
```

Signals - IGNORETRANS

The IGNORETRANS signal causes the transaction where the following INSERT appears to be ignored.

Execute the following SQL statement to send a IGNORETRANS signal.

```
INSERT INTO SQLDBA.MQ_TEST3 VALUES('B', 1, -9999.99);
INSERT INTO ASN.IBMQREP_SIGNAL(
 SIGNAL_TIME,
 SIGNAL_TYPE,
```

```
 SIGNAL_SUBTYPE,
 SIGNAL_INPUT_IN,
 SIGNAL_STATE )
VALUES (
 CURRENT TIMESTAMP,
 'CMD',
 'IGNORETRANS',
 NULL,
 'P');
COMMIT;
```

There is no messages on the console. The updates to the table will appeare in the source table but not in the target table because they are ignored.

Signals - STOP

The STOP signal stops the Q Capture program.

Execute the following SQL statement to send a STOP signal.

```
INSERT INTO ASN.IBMQREP_SIGNAL(
 SIGNAL_TIME,
 SIGNAL_TYPE,
 SIGNAL_SUBTYPE,
 SIGNAL_INPUT_IN,
 SIGNAL_STATE )
VALUES (
 CURRENT TIMESTAMP,
 'CMD',
 'STOP',
 NULL,
 'P');
COMMIT;
```

The following text shows an example output:

```
2004-06-11-15.53.18 ASN7019I "MQCAP" : "ASN" : "STOP" signal was received
and will be processed.
DASD 0300 DETACHED
DASD 0301 DETACHED
DASD 0302 DETACHED
2004-06-11-15.53.18 ASN0573I "MQCAP" : "ASN" : The program was stopped.
```

Initial load

Loading options

When you create a Q subscription, you can choose among the following options for loading target tables with data from the source:

Automatic load
The Q Apply program manages the loading of target tables. The Crossloader utility is used. This option is also known as an internal load.

Manual load
You handle the loading of target tables, and then signal the replication programs when loading is done. This option is also known as an external load.

No load
You either do not load target tables, or you load target tables outside the context of the replication programs.

Automatic load

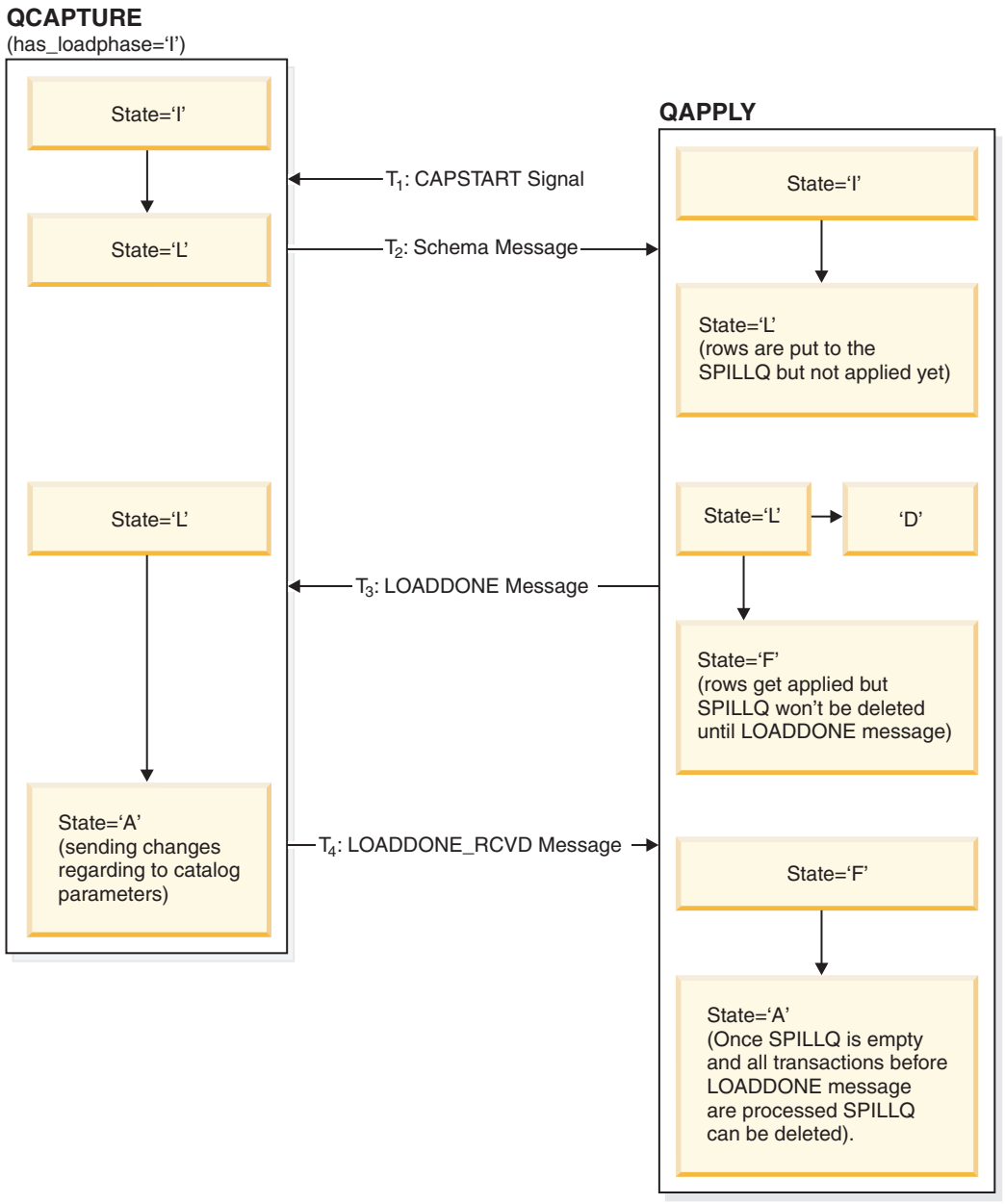


Figure 3. Automatic load

When a subscription is activated with the internal load (automatic load)option, the Q Capture program sends the SUBSCHEMA message to the Q Apply program. The Q Capture program also starts sending any changes to the table represented by the subscription. After receiving the SUBSCHEMA message, the Q Apply program invokes the Crossloader utility, to start loading into the target table, and also starts spilling the changes sent by the Q Capture program into a SpillQ. A SpillQ is an MQSeries queue that holds all the messages until the Q Apply program has finished loading into the target table. When the Load Utility completes loading, the Q Apply program sends a LOADDONE message to the Q Capture program and immediately begins applying the changes from the SpillQ. The Q Capture program then acknowledges by sending a LOADDONE_RCVD message to the Q Apply

program. Once the Q Apply program sees the LOADDONE_RCVD message, it ensures that all the transactions before the message have been processed and the SpillQ is empty. The Q Apply program then sets the STATE in the IBMQREP_TARGETS table to 'A' (active).

The Crossloader (LOAD from CURSOR) utility uses LOAD utility to move data from the source table to the target table without creating an intermediate exported file. The Crossloader utility requires federated database suppport.

The Crossloader utility is supported on DB2 UDB Version 8.1 or later for Linux, UNIX, and Windows, and for DB2 UDB Version 7.1 for z/OS or later.

When using the Crossloader utility for the LUW platforms, you must create the nickname for the source table and specify the nickname in the IBMQREP_TARGETS table.

When using the Crossloader utility for the z/OS platforms, with a 3 part name, a select statement can be constructed that selects data from a remote platform, through the DB2 client/server protocol.

If the load utility is not available, , then Q Apply will send an Admin message to Q Capture to disable the subscription. The state of the subscription on the Q Capture (in the IBMQREP_SUBS table) and on the Apply (in the IBMQREP_TARGETS table) will be marked Inactive.

Set up federated system and create a nickname.

Procedure:

1. Connect to the target db.
2. Update the db manager configuration for federated system.
3. Catalog a remote node hosting the remote VM/VSE source database.
4. Catalog a remote database.
5. Create a wrapper.
6. Create a server definition.
7. Create user mapping.
8. Test the connection.
9. Create nicknames.

Manual load

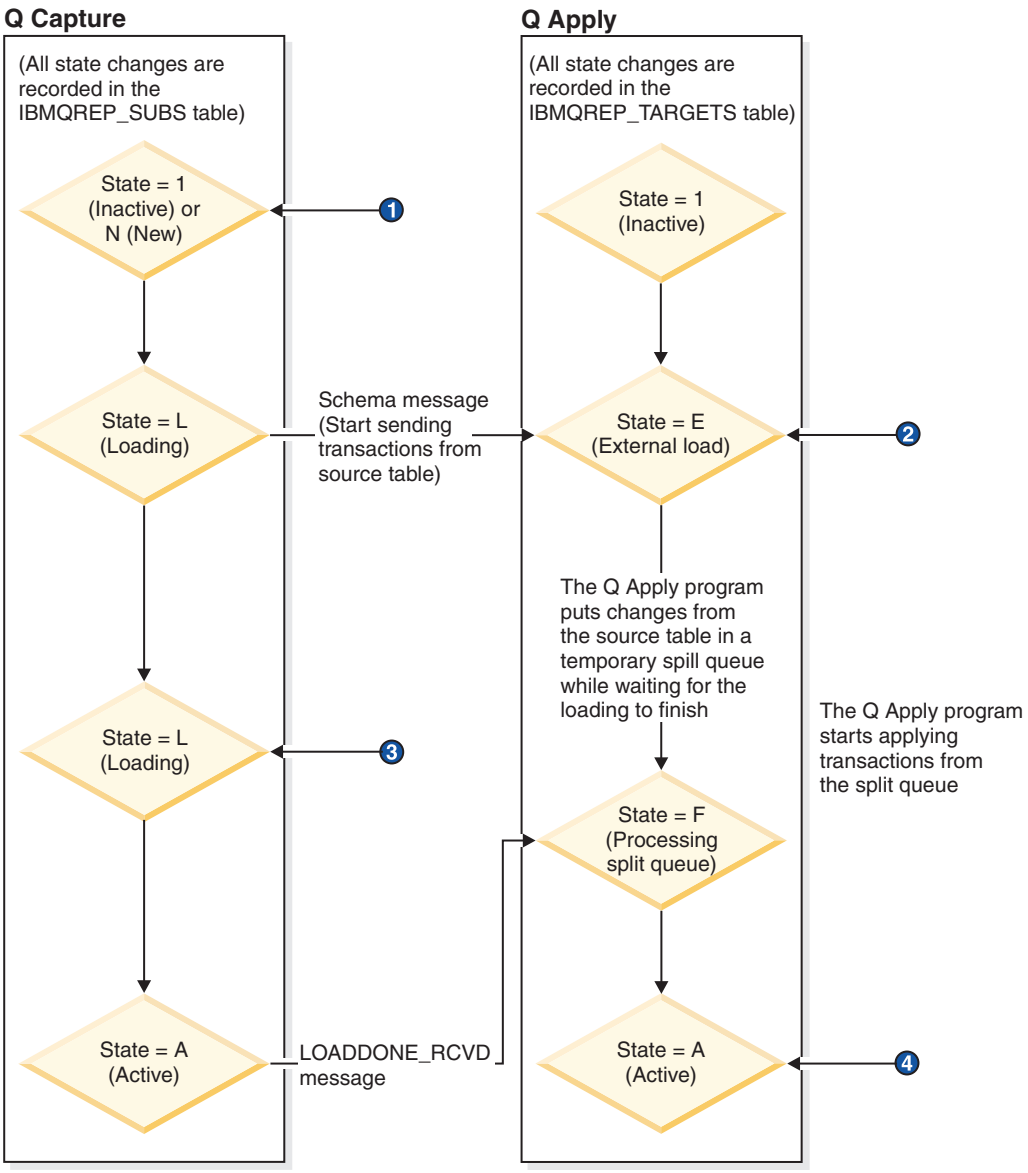


Figure 4. Manual load

Notes:

1.
   - Use Manage Q Subscriptions window to activate the Q subscription, or;
   - Insert a CAPSTART signal in IBMQREP_SIGNAL table
2. Start loading the target table when:
   - The Manage Q Subscriptions window "Requires manual load", or;
   - The IBMQREP_TARGETS table shows state E
3. When target table is loaded, signal the Q Capture program by:
   - Using the Manage Q Subscriptions window (click Load done), or;
   - Insering a LOADDONE signal in the IBMQREO_SIGNAL table
4. Start using the target table when:

- The Manage Q Subscriptions window shows Active or ASN76061, or;
- The IBMQREP_TARGETS table shows state A and STATE_INFO ASN76061

Procedure:

To perform a manual load, the user needs to perform the following steps

1. On seeing the State is '**E**' in the IBMQREP_TARGETS, column STATE, the user can start the load utility of choice.
2. After the loading is complete, the user must send a LOADDONE signal to the Q Capture program. This task can be done either via the Replication Center or by inserting the LOADDONE signal in the SIGNAL table as follows [the following corresponds to a signal for subscription named 'SUB1']:

```
insert into ASN.IBMQREP_SIGNAL(
 SIGNAL_TIME,
 SIGNAL_TYPE,
 SIGNAL_SUBTYPE,
 SIGNAL_INPUT_IN,
 SIGNAL_STATE)
values (
 CURRENT TIMESTAMP,
 'CMD',
 'LOADDONE',
 'SUB1',
 'P' );
```

The Q Capture program then sends a LOADDONE_RCVD message to Q Apply. On seeing the LOADDONE_RCVD message, the Q Apply program starts applying the changes from the SpillQ queue. Once the SpillQ is empty, the Q Apply program changes the State to '**A**'.

No load

A user can also choose not to have a load phase in the following scenarios:

- When the user is adding a large number of new tables to replication. In this case, the user selects a down period, such as the weekend, quiesces the source tables, loads the target tables, and is ready to start the Q Capture and Q apply programs.
- Users do not care about the inconsistency between the source and target tables.

Recommendations for loading

Applications at the target

- Do not allow applications to update the target tables while the target tables are being loaded. Data in the tables will be inconsistent while the tables are being loaded, and the Q Apply program drops referential integrity constraints until the target table and any other related target tables are loaded.
- Applications can safely use target tables again when the Q Apply program makes the following changes to the IBMQREP_TARGETS table:
  - Sets the STATE column to A (active).
  - Sets the STATE_INFO column to ASN7606I, which means that if the target table had referential integrity constraints, they have been restored.
- If the loading process fails, or if the Q Apply program stops during the load, any data that was in the target table before the load began is deleted. Changes that were made to the source table during the load process are not lost, and they will be applied to the target table after it is successfully loaded.

Applications at the source

- Load target tables during a time of relative inactivity at the source.

Starting Capture

Starting the Q Capture program on VM

The Q Capture program is invoked by passing arguments to the ASNQCAP program. For example:

```
asnqcap capture_server=SQLMACH7 autostop=n
```

This argument invokes the Q Capture program against SQLMACH7 and picks up the other parameters from the CAPPARMs table and/or will use the defaults.

Should also have a filedef for the log file:
`FILEDEF DISK ASNQLOG FILE A`

Starting the Q Capture program on VSE

The Q Capture program is invoked by submitting JCL with the following:

```
// JOB ASNQ74BD
// LIBDEF    *,SEARCH=(STSPVT.DEVELOP,STSPVT.DB2730,
SPINLIB.ASN74S21,DB2LIB.DB2730C,
PRD2.MQSERIES,PRD2.SCEEBASE)
// EXEC PROC=DB2730RM    *-- DB2 DATABASE ID PROC
// DLBL USERCAT,'VSAMRM.USER.CATALOG',,VSAM
// DLBL MSGS,'ASNQS001.MESSAGE.FILE',,VSAM,CAT=USERCAT
// OPTION LOG
// OPTION NODUMP
// SETPARM MQBISRV='MQDB2RM'
// EXEC ASNQCAP,SIZE=AUTO,PARM='CAPTURE_SERVER=SQLDS STARTMODE=*
WARMSI USERID=SQLDBA/SQLDBAPW'
```

The SETPARM is the identifier for the Batch Interface. It corresponds to a setting in the Batch Interface Setup.

Starting the Q Apply program

Refer to *DB2 UDB Replication and Event Publishing Guide* for details on starting the Q Apply program.

Chapter 5. Running the Q Capture program on VM and VSE (target is a VM or VSE platform)

Overview

This chapter describes the setup required for replicaiton to a VM or VSE target. This chapter explains the scenario in detail and the resulting replication configuration which is required. The DB2 UDB federated support is used for this scneario.

Some customers may want to replicate data from a VM or VSE platform to a VM or VSE platform. There is no Q Apply program that runs on the VM and VSE platforms, so replication can occur only by using a mixed environment of Q replication and SQL replication. The environment would look like the following diagram:

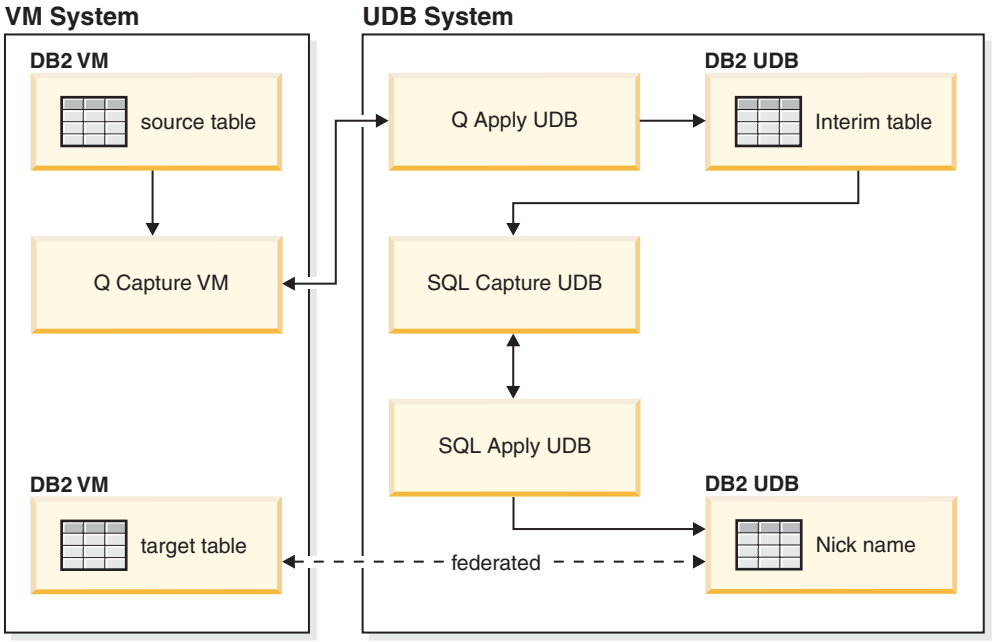


Figure 5. The replication environment

In this setup, the changes to the source table on VM or VSE are captured by the Q Capture program and applied to an 'interim' table on DB2 UDB by the Q Apply program. This 'interim' table must reside in a database that has federated support. SQL Capture is set up to capture changes from the 'interim' table to be applied to a nick name on DB2 UDB. This nick name points to a VM or VSE target table through the DB2 UDB federated system.

Setting up the federated system

To set up the federated system

1. Connect to the target database by entering the following command on the command line:

   Connect to dbname **user** local_userID **using** local_userPWD

Example: connect to test1 user db2admin using adminpwd

2. Update the database manager configuration for a federated system:

   Update dbm cfg using federated yes

3. Catalog the remote node that is hosting the remote VM/VSE source database:

   Catalog tcpip **node** nodename **remote** hostname **server** servername

   Example: catalog tcpip node torvmcb6 remote torvmcb6.torolab.ibm.com server dbuser1

4. Catalog the remote database:

   Catalog database remotedbname **as** remotealiasname **at node** nodename

   Example: catalog database dbuser1 as dbuser1 at node torvmcb6

5. Create the drda wrapper:

   Create wrapper wrappername

   Example: create wrapper drda

6. Create the VM or VSE server definition:

   Create server servername **type** typename **version** versionname **wrapper** wrappername **authorization** remote_auth_ID **password** remote_auth_PWD **option** (**node** 'nodename', **dbname** 'dbname')

   Example: create server dbuser1 type db2/vm version 7.3.0 wrapper drda authorization user1 password pwd1 options (node 'torvmcb6, dbname 'dbuser1')

7. Create the user mapping:

   Create user mapping for local_authID **server** remote_servername **options**(**remote_authid** 'id', **remote_password** 'pwd')

   Example: create user mapping for db2admin server dbuser1 options (remote_authid 'user1', remote_password 'pwd1')

8. Test the connection:

   Set passthru remote_servername

   Select * **from** remote_schema_name.tablename

   Set passthru reset

   Example: Set passthru dbuser1
   *Select * from sqldba.table1*
   Set passthru reset

9. Create the nicknames:

   Create nickname new_local_name **for** remote_servername.schema.tablename

   Example: create nickname loc_table1 for dbuser1.sqldba.table1

Now the federated environment is set up. You can set up the Q replication from a VM database to a UDB database as explained in the previous section. The SQL replication can be set up as described in the Replication Guide.

Chapter 6. Problem diagnosis

Overview

The Q Capture trace facility outputs the data that can be used by IBM support for problem diagnosis. It outputs information that is intended for IBM support personnel. The trace facility can be turned on at startup or can be turned on while the Q Capture program is running.

Tracing

FILEDEFs on VM

The following FILEDEF is required to Run a Q Capture trace on VM:

'FILEDEF ASNQTRC DISK fn ft fm'
where the ddname is ASNQTRC, the output device is DISK and fn, ft, fm can be whatever you like.

The trace output must be formatted and can either be formatted by you or IBM support. The FILDEF required for the formatted output is:

'FILEDEF ASNTRFM DISK fn ft fm'
where the ddname is ASNTRFM, the output device is DISK and fn, ft, fm can be whatever you like.

Turning trace on and off

The Q Capture trace can be turned on by the startup parameter trace_active. The default value for this parameter is'N', meaning trace is not turned on. There are two ways to turn trace on:

`TRACE_ACTIVE`
Default value 'N', Trace is OFF.

Turnning trace on

- Turning trace ON at capture startup.
  - Specify trace_active=Y as a capture startup parm.
    eg. asnqcap capture_server=VMONISG trace_active=Y...
- Turning trace on while capture is running.
  - Use the CHGPARMS operator command to turn trace ON.
    -chgparms trace_active=Y.

Turning trace off

- Use the CHGPARMS operator command to turn trace OFF.
  -chgpamrs trace_active=N
- The STOP operator command will turn trace OFF.
- Capture abend will turn trace OFF.
  - Filedef is required to format trace.

Formatting and reading trace output

Invoke the ASNFMT module to format the trace output. The filedefs mentioned earlier are required for VM. The following example illustrates trace output:

```
3183 asnqcap:updateTrace fnc_exit at 2004-06-15-09.08.12.029145
3184 asnqcap:explain_error fnc_entry at 2004-06-15-09.08.12.029260
3185 asnqcap:trlblk fnc_entry at 2004-06-15-09.08.12.029306
3185 asnqcap:trlblk fnc_exit at 2004-06-15-09.08.12.029352
3185 asnqcap:trlblk fnc_entry at 2004-06-15-09.08.12.029398
3185 asnqcap:trlblk fnc_exit at 2004-06-15-09.08.12.029444
3185 asnqcap:trlblk fnc_entry at 2004-06-15-09.08.12.029491
3185 asnqcap:trlblk fnc_exit at 2004-06-15-09.08.12.029536
3185 asnqcap:trlblk fnc_entry at 2004-06-15-09.08.12.029581
3185 asnqcap:trlblk fnc_exit at 2004-06-15-09.08.12. 029626
3184 asnqcap:explain_error fnc_exit at 2004-06-15-09.08.12.029271
3 isParm fnc_entry at 2004-06-15-09.08.20.681751
4 isValidIndex fnc_entry at 2004-06-15-09.08.20.681799
4 isValidIndex fnc_exit at 2004-06-15-09.08.20.681843
3 isParm fnc_exit at 2004-06-15-09.08.20.681884
2 msgtrans:sqlogmsg fnc_exit at 2004-06-15-09.08.20.681927
1 msgtrans:AsnCatgets fnc_exit at 2004-06-15-09.08.20.681972 RC=0
1 asnqcap:wto fnc_entry at 2004-06-15-09.08.20.682032
1 asnqcap:wto fnc_exit at 2004-06-15-09.08.20.682073
1 msgtrans:writeLog fnc_entry at 2004-06-15-09.08.20.682115
1 msgtrans:writeLog fnc_exit at 2004-06-15-09.08.20.682158 RC=0
1 msgtrans:writeDbRec fnc_entry at 2004-06-15-09.08.20.682205
1 msgtrans:ProcessMsg fnc_exit at 2004-06-15-09.08.20.682275 RC=0
0 delmsgtrans fnc_entry at 2004-06-15-09.08.20.682375
0 delmsgtrans fnc_exit at 2004-06-15-09.08.20. 682416
```

Chapter 7. Important hints and tips

Overview

The following section contains important considerations for running the Q Capture program in a VSE or VM environment. Read this section thoroughly and apply the recommendations to your system.

Control table considerations

The DB2 Replication Center by default creates the control tables in a dbspace with a size of 128 pages.

Default values in control tables

Table 2 shows the fields in the IBMQREP_CAPPARMS table that should be changed for VSE & VM. When using the Replication Center, you are presented with the SQL script that will be executed against the database. You may edit that script and change the values as outlined in Table 2.

Table 2. Values in control table

Field	Default value	VSE & VM recommended value:
Logstdout	N	Y
trace_limit	10080 (min)	Dependent on dbspace size
prune_interval	300 (secs)	3600 (secs)
commit_interval	500 (secs)	1000 (secs)

The **commit_interval** default set by the Replication Center is 500 (secs). This value is not suitable for the Q Capture program for VSE & VM. The Q Capture program for VSE & VM will not enter the sleep state if the commit_interval is less than 1000 (secs) due to the nature of the internal time function used for calculation. If you do not change the commit_interval value from 500 (secs), the Q Capture program recognizes it to be less than 1000 and automatically updates it. You will see a message that indicates that the value has been changed. The output on the console looks like the following example:

```
2004-07-27-22.59.58 ASN0541E "MQCAP" : "ASN" : An incorrect value "500" was
supplied for column "COMMIT_INTERVAL" of the program parameter table
"PARAMETERS TABLE".

Setting COMMIT_INTERVAL to 1000.
```

The **logstdout** parameter is by default set to N, which prevents informational messages, which could be used for diagnostic purposes, to be displayed on the console. Change this value to Y.

The **trace_limit** is by default set to 10080 minutes or 7 days. This parameter defines the number of minutes the data in the IBMQREP_CAPTRACE table is retained before it is pruned. If the dbspace is created with the default of 128 pages and pruning is quite frequent, the dbspace could fill up quickely because

operations such as pruning insert a message in the trace table. As a result, this trace_limit parameter should be reduced, dbspace size increased, and the prune_interval decreased.

The **prune_interval** is the number of seconds that must elapse before attempting to prune the IBMQREP_SIGNAL and IBMQREP_CAPTRACE tables. The default is 300 seconds. We recommend increasing this value to the maximum of 3600 seconds. Pruning on the other platforms involves cleaning up additional tables associated with monitoring and those tables should be pruned more frequently. However, the Q Capture program on VSE & VM does not support monitoring.

Dataspace considerations

memory_limit: The default value is 32 MB. This value represents the size of the dataspace that will be created by the Q Capture program to store the data as it is read in the log file. The data on the dataspace is not cleared and reused by the Q Capture program until it performs an MQ commit. The frequency of an MQ commit is defined by the **commit_interval** value.

The Q Capture program will create additional dataspaces of this size when there is no space left on existing dataspaces. The total size of the dataspaces and the number of dataspaces is defined on VM by the XCONFIG statements in the directory of the Q Capture computer (refer to section where we talked about XCONFIG statements)

The **memory_limit** value must be set depending on a number of factors:

- The number of active transactions running in the system at one time
- The size of the transactions
- The **commit_interval** value

A good initial value for this size could be the size of your DB2 log file.

Important Note: The VM computer must be set to XC mode. If the VM computer is not in XC mode, an operation exception is encountered and the Q Capture program terminates abnormally.

Storage Considerations

The Q Capture machine in a VM or VSE partition must be set to a minimum of 32 MB for VM and to 15 MB for VSE before it can start. Beyond that, the storage the Q Capture program needs depends on the number of subscriptions and the size of the data going onto the MQ queue as the messages are being built.

VSE queue maintenance considerations

In VSE, because there is a VSAM file associated with the queues, it is quite common for the queue to fill up even though messages are being retrieved from the queue. When the queues fill up, the steps to follow are outlined in this section. If the ERROR_ACTION column of the IBMQREP_SENDQUEUES is 'I', the subscription is invalidated when a queue fills up, but capture stays up. If the value is 'S', capture is stopped when a queue fills up:

Queue maintenance steps:

1. Determine which queue has filled up. Is it a Q Capture queue or an MQ system queue?
2. If it is a Q Capture queue, stop the Q Capture program.

3. Reorganize the VSAM file for the queue.
4. Start the Q Capture program.
5. Send a signal to the Q Capture program to activate the subscriptions and start capturing the data again.

The Q Capture queues that could fill up are the Restart queue, Administration queue, or the local transmission queue for the Send queue. If an MQ system queue, such as SYSTEM.LOG, fills up, capture continues to work. The Q Capture program does not have to be stopped in order to reorganize these queues.

Appendix. Q Capture control tables

The following list shows the Q Capture control tables generated by the Replication Center:

- IBMQREP_CAPPARMS
- IBMQREP_SENDQUEUES
- IBMQREP_SUBS
- IBMQREP_SRC_COLS
- IBMQREP_SIGNAL
- IBMQREP_CAPTRACE
- IBMQREP_ADMINMSG
- IBMQREP_CAPMON (not used by Q Capture for VSE/VM)
- IBMQREP_CAPQMON (not used by Q Capture for VSE/VM)
- IBMQREP_SRCH_COND (not used by Q Capture for VSE/VM)
- IBMQREP_CAPENQ (not used by Q Capture for VSE/VM)

Underlined column names are the primary key columns of the table

All fields are nullable unless specifically marked as ″NOT NULL″

IBMQCAP_CAPPARMS control table

The IBMQCAP_CAPPARMS control table contains startup parameters for one instance of the Q Capture program.

When the Replication Center creates the control table, it initializes it with one row containing the default values.

```
CREATE TABLE ASN.IBMQREP_CAPPARMS (
 QMGR VARCHAR(48) NOT NULL, //MQ Queue Manger name

 REMOTE_SRC_SERVER VARCHAR(18), //server name for remote log
     //reading  (for future)

 RESTARTQ VARCHAR(48) NOT NULL, //name of the MQ queue for
       //restart info; must be unique for
       //each instance of Q Capture
       // see note (3) below

 ADMINQ VARCHAR(48) NOT NULL, //name of the queue for receiving
      //Qapply msg; must be unique for
      //each instance of Q Capture

 STARTMODE VARCHAR(6) NOT NULL, //where to start reading log upon
       //restart (cold or warm)

 MEMORY_LIMIT INTEGER NOT NULL, //maximum size in MB for dataspace;
      // default 32MB

 COMMIT_INTERVAL INTEGER NOT NULL, //max time in ms between MQ
      //commits; see note (1) below

 AUTOSTOP CHAR(1) NOT NULL, //Q Capture stops if and when reading
      //end of log;  default "N"
```

```
MONITOR_INTERVAL INTEGER NOT NULL, //not used by Q Capture VSE/VM

MONITOR_LIMIT INTEGER NOT NULL, //not used by Q Capture VSE/VM

TRACE_LIMIT INTEGER  NOT NULL, //number of minutes of trace
     //table info to be kept before
     //being pruned; see note (1) below

SIGNAL_LIMIT INTEGER NOT NULL, //number of minutes of signal table info in
     //captrace table before being pruned

PRUNE_INTERVAL INTEGER NOT NULL, //number of seconds to wait between
     //pruning the signal and captrace
     //tables; see note (2) below

SLEEP_INTERVAL INTEGER NOT NULL, //number milliseconds that Q Capture
     //sleeps when it finishes processing the
     //active log; default value 5000ms

LOGREUSE CHAR(1) NOT NULL, //whether capture reuses or appends
     //msg to the log file

LOGSTDOUT CHAR(1) NOT NULL, //write message to both console(stout)
     // and log file; see note (1) below

TERM CHAR(1) NOT NULL, //determine if Q Capture terminates if
    //terminates;  see note (2) below

CAPTURE_PATH VARCHAR(1040), //default NULL; not used by Q Capture
    //VSE/VM

ARCH_LEVEL CHAR(4) NOT NULL) //the architectural level of the definition
     //contained in the row; value "0802"
     //stands for version 8.2
IN XXXXXX;
```

- The follow index is created for the capparm table:

  CREATE UNIQUE INDEX ASN.IX1CQMGRCOL ON
  ASN.IBMQREP_CAPPARMS
  (QMGR ASC);

- The following row was inserted to the CAPPARM table when created by the Replication Center:

```
INSERT INTO ASN.IBMQREP_CAPPARMS
 (qmgr, restartq, adminq, startmode, memory_limit, commit_interval,
 autostop, monitor_interval, monitor_limit, trace_limit, signal_limit,
 prune_interval, sleep_interval, logreuse, logstdout, term, arch_level)
VALUES
 ('SQLDSMQ', 'MTVMRESTART', 'MTVMADMIN', 'WARMSI', 32, 500, 'N', 300,
 10080, 10080, 10080, 300, 5000, 'N', 'N', 'Y', '0802');
```

- STARTMODE can have the following values:
  - code
  - warmsi (default)
  - warmns
  - warmsa

  Code - The Q Capture program sets all subscriptions to INACTIVE state, clear the restart queue and the admin queue.

  Warmsi - The Q Capture program warm starts; unless the Q Capture program is initializing for the first time. In that case switches to a cold start. The warmsi start mode ensures that cold starts happen only when you initially start the Q Capture program.

Warmns - The Q Capture program warm starts. If it can't warm start, it does not switch to cold start. The warmns start mode prevents cold starts from occurring unexpectedly, and it is useful when problems arise (such as unavailable databases or table spaces) that require repair and that prevent a warm start from proceeding. When the Q Capture program warm starts, it resumes processing where it ended. If errors occur after the Q Capture program starts, the Q Capture program terminates and leaves all tables intact.

Warmsa - If warm start information is available, the Q Capture program resumes processing where it ended in its previous run. If the Q Capture program cannot warm start, it switches to a cold start.

Note: During warm starts the Q Capture program only loads those subscriptions that are not in INACTIVE state)

- COMMIT_INTERVAL: The default set by RC is 500ms. This is not suitable for Q Capture for VSE/VM. Q Capture for VSE/VM does not go into the sleep state if the commit_interval is less than 1000ms due to the time function used for calculation. We have changed the minimum value of the parameter and its default value to 1000ms. Q Capture for VSE/VM users receive a message if the commit_interval value is less than 1000ms. The user should manually changes this value in the script before submitting it when using RC.
- Trace_limit - The default value set by RC is 10080m or 7 days. We consider this limit is too high for VSE/VM customers especially if the dbspace acquired is using the UDB default 128pages/dbspace. It is recommended that the VSE/VM user should adjust this value and the default dbspace value when using RC.
- Prune_interval - The default value set by RC is 300s. We consider this limit is too frenquent for VSE/VM customers. We recommend that you set the value to 3600s or 1 hour, the maximum value allowed.
- LOGSTDOUT- The default value set by RC is ″N″. We recommend that you set the value to ″Y″, so that more info will be displayed on the console.
- TERM - The default value is ″Y″. Q Capture for VSE/VM v74 does not support ″N″ for this parameter.

IBMQREP_SENDQUEUES control table

The IBMQREP_SENDQUEUES control table contains the MQ queue information that is used for sending transactions for a set of subscriptions.

```
CREATE TABLE ASN.IBMQREP_SENDQUEUES (

 PUBQMAPNAME VARCHAR(128) NOT NULL, //publication queue map name

 SENDQ VARCHAR(48) NOT NULL , //MQ queue name corresponds to a local queue
     //or the local definition of a remote queue.

 RECVQ VARCHAR(48), //receive queue name (for the q apply side)

 MESSAGE_FORMAT CHARACTER(1) NOT NULL ,

 MSG_CONTENT_TYPE CHARACTER(1) NOT NULL, //msg content type; 'T'
      //(transaction) or 'R'
      //(row); default 'T'

 STATE CHARACTER(1) NOT NULL , //status of the queue; default "A"-active
     //or "I" - inactive

 STATE_TIME TIMESTAMP NOT NULL , //timestamp of the last state change
     //default current timestamp

 STATE_INFO CHARACTER(8), //additional info regarding the state
```

```
 ERROR_ACTION CHARACTER(1) NOT NULL, //action taken when a send queue
      //is in error; default "I"- invalidate;
      //or "S" - stop Q Capture.

 HEARTBEAT_INTERVAL INTEGER NOT NULL, //interval in seconds between
      //heartbeat msg sent when no
      //transactions to publish; must be
      //multiple of commit_interval; default 0
      //- do not send;

 MAX_MESSAGE_SIZE INTEGER NOT NULL , //max size of buffer in KB used for
      //sending msg over the send queue;
      //default 64K

 APPLY_SERVER VARCHAR(18), //dbname of Q Apply server where the
     //target tables are defined

 APPLY_ALIAS VARCHAR(8), //alias of the name defined in the
    //previous column

 APPLY_SCHEMA VARCHAR(128), //schema of the Q Apply which applies
     //the changes on this receive queue

 DESCRIPTION VARCHAR(254), //user maintained description attribute

 primary key ( SENDQ )

) IN XXXXXX;
```

The following index is created on this table:

```
CREATE UNIQUE INDEX ASN.IX1PUBMAPCOL ON ASN.IBMQREP_SENDQUEUES
 (PUBQMAPNAME ASC);
```

MESSAGE_FORMAT - The default value is ″C″ for compact message type. Q Capture for VSE/VM only supports this type of message. The XML (″X″) encoding format is not supported.

IBMQREP_SUBS control table

The IBMQREP_SUBS control table identifies tables for which changes are captured, and onto which queue the transaction is published.

```
CREATE TABLE ASN.IBMQREP_SUBS (
 SUBNAME VARCHAR(132) NOT NULL, //subscript name; for any instance,
     //the subname has to be unique.

 SOURCE_OWNER VARCHAR(128) NOT NULL, //qualifier of the source
      //tables

 SOURCE_NAME VARCHAR(128) NOT NULL, //source table names

 TARGET_SERVER VARCHAR(18), //dbname of the Q Apply server
     //where target tables are defined

 TARGET_ALIAS VARCHAR(8), //alias of the dbname

 TARGET_OWNER VARCHAR(128), //target table owner

 TARGET_NAME VARCHAR(128), //target table name

 TARGET_TYPE INTEGER, //target type; always 1 - user table

 APPLY_SCHEMA VARCHAR(128), //schema of the Q Apply prg which applies
     //changes that are captured by this Q
```

```
    //Capture instance

SENDQ VARCHAR(48) NOT NULL , //queue name for writing the changes
    //involving this table

SEARCH_CONDITION VARCHAR(2048), //not supported by Q Capture VSE/VM

SUB_ID INTEGER, //sub id generated by Q Capture and supplied
  //to Q Apply in the schema msg

SUBTYPE CHARACTER(1) NOT NULL, //subscription type; default "U" -
    //unidirectional. This is the only
    //type supported by Q Capture
    //VSE/VM.

ALL_CHANGED_ROWS CHARACTER(1) NOT NULL, //whether to send the row if any
     //column in the row is changed;
     //default "N" (send only when s
     //subscripted column is changed

BEFORE_VALUES CHARACTER(1) NOT NULL, //whether to send before-value of the
     //column; for UPDATE and DELETE
     //only; default "N"

CHANGED_COLS_ONLY CHARACTER(1) NOT NULL, //send the after-value for only
      //changed columns; for
      //UPDATE only; default "Y"

HAS_LOADPHASE CHARACTER(1) NOT NULL, //whether or not the source table
     //will be loaded at the target; default
     //"I"- internal load;  "E"- external
     //load; and "N" for no load

STATE CHARACTER(1) NOT NULL , //initial state for the subscription;
    //default "N" - new; "L" - loading; "A" - active
    //and "I" - inactive.

STATE_TIME TIMESTAMP NOT NULL, //time stamp for last state change

STATE_INFO CHARACTER(8), //explanation on why the sub is in current state

STATE_TRANSITION VARCHAR(256) FOR BIT DATA, //internal column

SUBGROUP VARCHAR(30), //n/a to Q Capture VSE/VM

SOURCE_NODE SMALLINT NOT NULL , //n/a; always 0 for Q Capture VSE/VM

TARGET_NODE SMALLINT NOT NULL , //n/a; always 0 for Q Capture VSE/VM

GROUP_MEMBERS CHARACTER(254) FOR BIT DATA, //not used by Q Capture VSE/VM

OPTIONS_FLAG CHARACTER(4) NOT NULL , //reserved for future use

SUPPRESS_DELETES CHARACTER(1) NOT NULL, //do not send delete operation row; default "N"

DESCRIPTION VARCHAR(200), //description for the subscription

TOPIC VARCHAR(256), //n/a

primary key ( SUBNAME ) , FOREIGN KEY  FKSENDQ ( SENDQ )  REFERENCES ASN.IBMQREP_SENDQUEUES
) IN XXXXXX;
```

IBMQREP_SRC_COLS control table

The IBMQREP_SRC_COLS control table lists the source table columns for which changes are captured.

```
CREATE TABLE ASN.IBMQREP_SRC_COLS (
 SUBNAME VARCHAR(132) NOT NULL , //subscription name

 SRC_COLNAME VARCHAR(30) NOT NULL, //column name

 IS_KEY SMALLINT NOT NULL, //whether this column is part of the
     //key; default 0 - not key column;
     //n - the key column number

 primary key ( SUBNAME, SRC_COLNAME ) ,

 FOREIGN KEY  FKSUBS ( SUBNAME) REFERENCESASN.IBMQREP_SUBS)
IN XXXXXX;
```

IBMQREP_SIGNAL control table

The IBMQREP_SIGNAL control table is used for communication between the user/subscriber and the Q Capture program.

```
CREATE TABLE ASN.IBMQREP_SIGNAL(

 SIGNAL_TIME TIMESTAMP NOT NULL , //time the signal is inserted into the table

 SIGNAL_TYPE VARCHAR(30) NOT NULL, //type of signal; "CMD" or "USER"

 SIGNAL_SUBTYPE VARCHAR(30), //subtype for "CMD" signals;

 SIGNAL_INPUT_IN VARCHAR(250),

 SIGNAL_STATE CHARACTER(1) NOT NULL, //default "P" - pending; "R" - received by Q
      //Capture; "C" - completed; "F" - failed.

 SIGNAL_LSN CHARACTER(10) FOR BIT DATA, //LSN of the log record of this insert

 primary key ( SIGNAL_TIME ) ) DATA CAPTURE CHANGES IN XXXXXX;
```

- SIGNAL_SUBTYPE

  Values:

  – 'CAPSTART': Start capturing for the subscription sname on queue_name
  – 'CAPSTOP': Stop capturing for subscription sname on queue_name
  – 'QINERROR': Error occurred on the send queue or the receive queue that is associated with the send queue. Error action for the send queue specified will be executed according to the SENDQUEUES table.
  – 'LOADDONE': Tell the Q Capture program that the replicated table is now loaded.
  – 'STOP': Stop the Q Capture program.
  – 'IGNORETRANS': Ignore transaction that contains this signal

- SIGNAL_INPUT_IN - If the signal_type is 'USER', then this column contains user-defined input. If the signal_type is 'CMD', then the meaning of this value depends on the signal_subtype for this signal:

  Values:

  – Subscription name for CAPSTART, CAPSTOP, and LOADDONE
  – Send queue name and message text for QINERROR where message text is the ASN message number and tokens separated by space characters
  – NULL for STOP and IGNORETRANS

IBMQREP_CAPTRACE control table

The IBMQREP_CAPTRACE control table contains information and error messages generated by the Q Capture program.

```
CREATE TABLE ASN.IBMQREP_CAPTRACE(

 OPERATION CHARACTER(8) NOT NULL , //values "INFO", "WARNING" or
      //"ERROR"

 TRACE_TIME TIMESTAMP NOT NULL , //time when msg was written

 DESCRIPTION VARCHAR(1024) NOT NULL //asn msg id followed by the
      //msg text
 ) IN XXXXXX;
```

IBMQREP_ADMINMSG control table

The IBMQREP_ADMINMSG control table contains administration messages from the Q Apply program received by the Q Capture program.

```
CREATE TABLE ASN.IBMQREP_ADMINMSG(

 MQMSGID CHARACTER(24) FOR BIT DATA  NOT NULL , //MQ message id of the
       //admin msg

 MSG_TIME TIMESTAMP NOT NULL , //time the msg was inserted into the table

  primary key ( MQMSGID ) ) IN XXXXXX;
```

Notices

IBM may not offer the products, services, or features discussed in this document in all countries. Consult your local IBM representative for information on the products and services currently available in your area. Any reference to an IBM product, program, or service is not intended to state or imply that only that IBM product, program, or service may be used. Any functionally equivalent product, program, or service that does not infringe any IBM intellectual property right may be used instead. However, it is the user's responsibility to evaluate and verify the operation of any non-IBM product, program, or service.

IBM may have patents or pending patent applications covering subject matter described in this document. The furnishing of this document does not give you any license to these patents. You can send license inquiries, in writing, to:

IBM Director of Licensing
IBM Corporation
North Castle Drive
Armonk, NY 10504-1785
U.S.A.

For license inquiries regarding double-byte (DBCS) information, contact the IBM Intellectual Property Department in your country or send inquiries, in writing, to:

IBM World Trade Asia Corporation
Licensing
2-31 Roppongi 3-chome, Minato-ku
Tokyo 106-0032, Japan

The following paragraph does not apply to the United Kingdom or any other country where such provisions are inconsistent with local law:
INTERNATIONAL BUSINESS MACHINES CORPORATION PROVIDES THIS PUBLICATION "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Some states do not allow disclaimer of express or implied warranties in certain transactions, therefore, this statement may not apply to you.

This information could include technical inaccuracies or typographical errors. Changes are periodically made to the information herein; these changes will be incorporated in new editions of the publication. IBM may make improvements and/or changes in the product(s) and/or the program(s) described in this publication at any time without notice.

Any references in this information to non-IBM Web sites are provided for convenience only and do not in any manner serve as an endorsement of those Web sites. The materials at those Web sites are not part of the materials for this IBM product and use of those Web sites is at your own risk.

IBM may use or distribute any of the information you supply in any way it believes appropriate without incurring any obligation to you.

Licensees of this program who wish to have information about it for the purpose of enabling: (i) the exchange of information between independently created programs and other programs (including this one) and (ii) the mutual use of the information which has been exchanged, should contact:

IBM Canada Ltd.
Office of the Lab Director
8200 Warden Avenue
Markham, Ontario
L6G 1C7
CANADA

Such information may be available, subject to appropriate terms and conditions, including in some cases, payment of a fee.

The licensed program described in this information and all licensed material available for it are provided by IBM under terms of the IBM Customer Agreement, IBM International Program License Agreement, or any equivalent agreement between us.

Any performance data contained herein was determined in a controlled environment. Therefore, the results obtained in other operating environments may vary significantly. Some measurements may have been made on development-level systems and there is no guarantee that these measurements will be the same on generally available systems. Furthermore, some measurement may have been estimated through extrapolation. Actual results may vary. Users of this document should verify the applicable data for their specific environment.

Information concerning non-IBM products was obtained from the suppliers of those products, their published announcements, or other publicly available sources. IBM has not tested those products and cannot confirm the accuracy of performance, compatibility, or any other claims related to non-IBM products. Questions on the capabilities of non-IBM products should be addressed to the suppliers of those products.

All statements regarding IBM's future direction or intent are subject to change or withdrawal without notice, and represent goals and objectives only.

This information may contain examples of data and reports used in daily business operations. To illustrate them as completely as possible, the examples include the names of individuals, companies, brands, and products. All of these names are fictitious and any similarity to the names and addresses used by an actual business enterprise is entirely coincidental.

COPYRIGHT LICENSE:

This information may contain sample application programs in source language, which illustrates programming techniques on various operating platforms. You may copy, modify, and distribute these sample programs in any form without payment to IBM, for the purposes of developing, using, marketing, or distributing application programs conforming to the application programming interface for the operating platform for which the sample programs are written. These examples have not been thoroughly tested under all conditions. IBM, therefore, cannot guarantee or imply reliability, serviceability, or function of these programs.

Trademarks

The following terms are trademarks of International Business Machines Corporation in the United States, or other countries/regions, or both:

ACF/VTAM
C/370
CICS
CICS/VSE
DATABASE 2
DataPropagator
DB2
DFSMS
Distributed Relational Database Architecture
DRDA
IBM
Language Environment
MVS
OS/2
QMF
RACF
SAA
SQL/DS
System/370
VM/ESA
VSE/ESA
VTAM

Java and all Java-based trademarks are trademarks of Sun Microsystems, Inc. in the United States, other countries, or both.

Microsoft, Windows, Windows NT, and the Windows logo are trademarks of Microsoft Corporation in the United States, other countries/regions, or both.

Intel, Intel Inside (logos), MMX and Pentium are trademarks of Intel Corporation in the United States, other countries, or both.

UNIX is a registered trademark of The Open Group in the United States and other countries.

Linux is a trademark of Linus Torvalds in the United States, other countries, or both.

Other company, product and service names may be trademarks or service marks of others.

Index

A

Activating Q subscription 22
Administration queue (for Q Apply) 2
Administration queue (for Q Capture) 2
adminq 15
ASNQCAP 12
Automatic Load 34
autostop 16

C

CAPSTART 30, 52
CAPSTOP 30, 52
channel name 5
CHGPARMS 27, 41
Code 48
commit_interval 16
Control Table Considerations 43
Crossloader 35
Current Dataspace 29

D

Dataspace Name 29
Dataspace Size 29
Deactivating a Q subscriptions 23
Default Values in Control Tables 43

I

IBMQCAP_CAPPARMS 47
IBMQREP_ADMINMSG 53
IBMQREP_CAPTRACE 53
IBMQREP_SENDQUEUES 49
IBMQREP_SIGNAL 52
IBMQREP_SRC_COLS 51
IBMQREP_SUBS 50
IGNORETRANS 32, 52

L

Last Committed Transaction 29
LOADDONE 31, 52
logreuse 17
logstdout 17

M

Manual load 33, 37
Maximum transaction size 29
memory_limit 17
MQ environment 2

N

No load 37
Number of Dataspaces 29

O

Operating a Q Capture Program 11
Operator Commands 25

P

port 5
PRUNE 28
Prune interval expiration 29
prune_interval 18

Q

Q Capture Control Tables 47
Q Capture on VM 5
Q Capture on VSE 4
Q Replication 1
QINERROR 32, 52
qmgr 18
QRYPARMS 27
Queue manager 2

R

Receive queue 2
REINIT 26
REINIT_SUB 31
REINITQ 26
Restart Commit Sequence 29
Restart queue 2
restartq 19

S

Send queue 2
server address 5
Setting up Q Capture
  MQ Setup for VM 5
  MQ Setup for VSE 7
signal_limit 19
sleep_interval 19
Spill queue 2
SQL signals 29
Starting a Q Capture Program 11
startmode 20
STATUS 28
STOP 52
STOP command 25
Stopping a Q Capture program 24

T

term 21
TRACE_ACTIVE 41
trace_limit 21
Tracing 41

W

Warmns 49
Warmsa 49
Warmsi 48

Contacting IBM

Before you contact DB2 customer support, check the product manuals for help with your specific technical problem.

For information or to order any of the DB2 Server for VSE & VM products, contact an IBM representative at a local branch office or contact any authorized IBM software remarketer.

If you live in the U.S.A. you can call one of the following numbers:

- 1-800-237-5511 for customer support.
- 1-888-426-4343 to learn about available service options.

Product information

DB2 Server for VSE & VM product information is available through telephone or by the World Wide Web at http://www.ibm.com/software/data/db2/vse-vm

This site contains the latest information on the technical library, product manuals, newsgroups, APARs, news, and links to Web resources.

If you live in the U.S.A. you can call one of the following numbers:

- 1-800-IBM-CALL (1-800-426-2255) to order products or to obtain general information.
- 1-800-879-2755 to order publications.

For information on how to contact IBM outside of the United States, go to the IBM Worldwide page at http://www.ibm.com/planetwide

In some countries, IBM-authorized dealers should contact their dealer support structure for information.

File Number: 0000
Program Number: 1234

Printed in USA

Spine information:

DB2 Server for VSE & VM

DB2 DataPropagator Q Capture Supplement

Version 7 Release 4