Requirements for DB2 for i

Contents		DB2 for i	
	Capture	**Hub**	**Integrate**
	✅	✅	✅

This section describes the requirements, access privileges, and other features of HVR when using 'DB2 for i' for replication. For information about compatibility and supported versions of DB2 for i with HVR platforms, see Platform Compatibility Matrix.

For the Capabilities supported by HVR on DB2 for i, see Capabilities for DB2 for i.

For information about the supported data types and mapping of data types in source DBMS to the corresponding data types in target DBMS or file format, see Data Type Mapping.

ODBC Connection

HVR is not installed on the DB2 for i system itself but is instead installed on a Linux or Windows machine, from which it uses ODBC to connect to the DB2 for i system. HVR uses ODBC connection to read and write data to DB2 for i location.

The following are required for HVR to establish an ODBC connection to the DB2 for i system:

- On Linux:
  - IBM i Access Client Solutions ODBC Driver 64-bit
  - ODBC driver manager UnixODBC
- On Windows:
  - IBM i Access Client Solutions ODBC Driver

The IBM i Access Client Solutions ODBC Driver is available for download from IBM ESS Website (requir es user authentication). Choose product-number '5770-SS1', and then choose package 'IBM i Access - Client Solutions' for your platform. For information about the supported ODBC driver version, refer to the HVR release notes (**hvr.rel**) available in **hvr_home** directory or the download page.

Firewall

If a Firewall is configured between the HVR capture machine and the IBM i-series, the following default ports need to be opened in order to be able to connect via ODBC from the capture to the IBM i-series:

PC Function	Service name i-series	Port non-SSL	SSL Port
Server mapper	as-svrmap	449	449
License Management	as-central	8470	9470

RPC/DPC (Remote command)	as-rmtcmd	8475	9475
Sign-On Verification	as-signon	8476	9476
Database Access	as-database	8471	9471

The port numbers mentioned here are the default port numbers. To verify the default port numbers for the services names, use the command **wrksrvtble** on AS/400 console.

Location Connection

This section lists and describes the connection details required for creating DB2 for i location in HVR.

Field	Description
Database Connection	
System	The hostname or IP-address of the DB2 for i system. **Example:** 192.168.1.135
Named Database	The named database in DB2 for i. It could be on another (independent) auxiliary storage pool (IASP). The user profile's default setting will be used when no value is specified. Specifying ***SYSBAS** will connect a user to the SYSBAS database.

User	The username to connect HVR to the **Named Database** in DB2 for i. **Example:** hvruser
Password	The password of the **User** to connect HVR to the **Named Database** in DB2 for i.
Linux	
Driver Manager Library	The optional directory path where the ODBC Driver Manager Library is installed. This field is applicable only for Linux/Unix operating system. For a default installation, the ODBC Driver Manager Library is available at **/usr/lib64** and does not need to be specified. However, when UnixODBC is installed in for example **/opt/unixodbc** the value for this field would be **/opt/unixodbc/lib**.
ODBCSYSINI	The optional directory path where **odbc.ini** and **odbcinst.ini** files are located. This field is applicable only for Linux/Unix operating system. For a default installation, these files are available at **/etc** and do not need to be specified. However, when UnixODBC is installed in for example **/opt/unixodbc** the value for this field would be **/opt/unixodbc/etc**. The **odbcinst.ini** file should contain information about the IBM i Access Client Solutions ODBC Driver under the heading **[IBM i Access ODBC Driver 64-bit]**.
ODBC Driver	The user-defined (installed) ODBC driver to connect HVR to the DB2 for i system.

Hub

HVR allows you to create a hub database in DB2 for i. The hub database is a small database which HVR uses to control its replication activities. This database stores HVR catalog tables that hold all specifications of replication such as the names of the replicated databases, the list of replicated tables, and the replication direction.

Grants for Hub

To capture changes from a source database or to integrate changes into a target database, the following privileges are required:

- The **User** should have permission to create and drop HVR catalog tables

Grants

The **User** should have permissions to read the following system catalogs:

- **qsys2.systables**
- **qsys2.syscolumns**
- **qsys2.systypes**
- **qsys2.syscst**
- **qsys2.syscstcol**
- **qsys2.sysindexes**
- **qsys2.syskeys**
- **sysibm.sysdummy1**
- **sysibm.sqlstatistics**
- **sysibmadm.system_value_info**

According to IBM documentation, the tables and views in the catalogs are shipped with the **SELECT** privilege to **PUBLIC**. This privilege may be revoked and only the **SELECT** privilege is granted to individual users.

To grant the **SELECT** privilege on, for example, table columns in **qsys2** schema, use the following statement:

```
grant select on qsys2.syscolumns to hvruser;
```

Capture

HVR supports capturing changes from DB2 for i location. This section describes the configuration requirements for **capturing** changes from DB2 for i location. For the list of supported DB2 for i versions, from which HVR can capture changes, see Capture changes from location in Capabilities.

Table Types

HVR supports capture from the following table types in DB2 for i:

- Tables
- Physical files
- Source files

Log-Based Capture

HVR performs log-based capture from DB2 fo i location using the DISPLAY_JOURNAL table function.

- The **user** should have permission to select data from journal receivers. This can be achieved in two ways:

    1. Create a **user** profile (e.g. **hvruser**) and assign the special authority (***ALLOBJ**). For this, run the following command from AS/400 console :

       ```
       CRTUSRPRF USRPRF(HVRUSER) SPCAUT(*ALLOBJ)
       ```

    2. If ***ALLOBJ** authority cannot be granted to the **user** (or if the **user** does not have ***ALLOBJ** authority), then separate access rights should be given on each journal. For this, run the following commands from AS/400 console.

        a. Create a **user** profile (e.g. **hvruser**) :

           ```
           CRTUSRPRF USRPRF(HVRUSER)
           ```

        b. Grant the authority ***USE** on object (e.g. **HVR**) to **user** :

           ```
           GRTOBJAUT OBJ(HVR) OBJTYPE(*LIB) USER(HVRUSER) AUT(*USE)
           ```

        c. Grant the authority ***USE** and ***OBJEXIST** on journal (e.g. **HVR/QSQJRN**) to **user** :

           ```
           GRTOBJAUT OBJ(HVR/QSQJRN) OBJTYPE(*JRN) USER(HVRUSER) AUT
           (*USE)

           GRTOBJAUT OBJ(HVR/QSQJRN) OBJTYPE(*JRN) USER(HVRUSER) AUT
           (*OBJEXIST)
           ```

        d. Grant the authority ***USE** on all journal receiver (e.g. **HVR/*ALL**) to **user** :

           ```
           GRTOBJAUT OBJ(HVR/*ALL) OBJTYPE(*JRNRCV) USER(HVRUSER) AUT
           (*USE)
           ```

- Tables grouped in the same HVR channel should be using the same journal (**Capture /LogJournal**)
- All changes made to the replicated tables should be fully written to the journal receivers
- IBM i Table attribute *IMAGES* should be set to ***BOTH** or ***AFTER** (supported only if **ColumnProperties /CaptureFromRowId** and **/SurrogateKey** are defined, since HVR 5.7.0/0)
- To enable these settings for each replicated table the journaling needs to be stopped and started again with the new settings. Example, for table *TAB1_00001* in schema *HVR*:

```
ENDJRNPF FILE(HVR/TAB1_00001) JRN(HVR/QSQJRN)
STRJRNPF FILE(HVR/TAB1_00001) JRN(HVR/QSQJRN) IMAGES(*BOTH)
```

or

```
CHGJRNOBJ OBJ((HVR/*ALL *FILE)) ATR(*IMAGES) IMAGES(*BOTH)
```

- IBM i Journal attribute *MINENTDTA* should be set to ***NONE**
- IBM i Journal attribute *RCVSIZOPT* should contain either **MAXOPT3* or **MAXOPT2*. When using **MAXOPT2*, it is recommended to define action **Capture /LogJournalSysSeq**. Otherwise, if action **Capture /LogJournalSysSeq** is not defined and when the journal sequence numbers are reset, then **HVR Initialize** should be run with **Transaction Files and Capture Time** (option **-or**) to reset the capture start sequence, and if the target location is a database, also select option **State Tables** (option **-os**) to reset the target state tables. After executing **HVR Initialize**, optionally, run **HVR Refresh** to repair any changes from before the new capture start that were missed.
  Action **Capture /LogJournalSysSeq** requires *FIXLENDTA* to contain **SYSSEQ*.

- The journal receivers should not be removed before HVR has been able to process the changes written in them.
- To enable these settings, run the following commands in the console. Example, for schema *HVR* running with **MAXOPT3*:

```
CHGJRN JRN(HVR/QSQJRN) JRNRCV(*GEN) MINENTDTA(*NONE) RCVSIZOPT
(*MAXOPT3)
```

- For running with **MAXOPT2* and **Capture /LogJournalSysSeq**:

```
CHGJRN JRN(HVR/QSQJRN) JRNRCV(*GEN) MINENTDTA(*NONE) RCVSIZOPT
(*MAXOPT2) FIXLENDTA(*SYSSEQ)
```

- When Action **Capture /IgnoreSessionName** is used, the name of the user making a change should be logged. In that case, IBM i Journal attribute *FIXLENDTA* should contain **USR*. Example, for schema *HVR* running with **MAXOPT3*:

```
CHGJRN JRN(HVR/QSQJRN) JRNRCV(*GEN) MINENTDTA(*NONE) RCVSIZOPT
(*MAXOPT3) FIXLENDTA(*USR)
```

- For running with **MAXOPT2* and **Capture /LogJournalSysSeq**:

```
CHGJRN JRN(HVR/QSQJRN) JRNRCV(*GEN) MINENTDTA(*NONE) RCVSIZOPT
(*MAXOPT2) FIXLENDTA(*SYSSEQ *USR)
```

Supplemental Logging

To enable supplemental logging, the **User** should be either the owner of the replicated tables or have **DBADM** or **SYSADM** or **SYSCTRL** authority.

Table changes in DB2 for i are logged by journal receivers, which collect images of the table states. HVR supplemental logging requires ***BOTH** or ***AFTER** (supported only if **ColumnProperties /CaptureFromRowId** and **/SurrogateKey** are defined) to be selected when setting the required journal *IMAGES* attribute.

For HVR versions prior to 5.6.0/13 and 5.6.5/4, to simplify the process of setting supplemental imaging for capturing on DB2 for i, HVR provides two shell scripts (**hvrsupplementalimage.qsh** and **suppl_log _template.qsh**) available in **hvr_home/lib/db2i** directory. The script file **hvrsupplementalimage.qsh** must be installed/copied into the iSeries **root** directory on the DB2 for i machine where changes are captured. The script is invoked by the command **HVR Initialize** with **Supplemental Logging** parameter selected in the **HVR GUI** or using command **hvrinit** (option **-ol**). The script will turn on either ***BOTH** or ***AFTER** depending on the action **ColumnProperties** **/CaptureFromRowId** and **/SurrogateKey** defined. **HVR Initialize** will silently invoke this script via the **SQL/QCMDEXC** interface for all tables that must be captured. The script can return its exit code to the calling HVR Hub via SQL only. For that, HVR creates a table in schema *HVR* called **hvr_supplementalimage_***channel*. If the *hvruser* does not have a table creation authority, then the **hvr_config/files/suppl_log_sysdba.qsh** script is created on the HVR Hub that can set all image settings without the need for table creation. The composite script is generated by inserting a list of schema table pairs into a template script (**suppl_log_template.qsh**) that is pulled from **hvr_home/lib/db2i**. The **suppl_log_sysdba.qshell** script may be transferred to the DB2 for i capture machine **root** directory and run there in QSHELL invoked by **STRQSH** command.

For HVR versions since 5.6.0/13 and 5.6.5/4, setting supplemental imaging for capturing on DB2 for i can be achieved without the need for external shell scripts. This method substantially speeds up initialization. However, HVR will create a table **hvr_qshellio_***channel* in Db2i to report whether the journaling *IMAGES* attribute ***BOTH** or ***AFTER** is enabled/set. Note that the scripts (**hvrsupplementalimage.qsh** and **suppl_log_template.qsh**) remain dormant yet available to be used in a contingency.

The file **hvrlogjournalpurge.qsh** available in **hvr_home/lib/db2i** directory is a shell script for manually deleting the outdated journal receivers. This script file can be used when there is a storage space problem because of configuring the db2i system to not delete journal receivers automatically.

Integrate and Refresh Target

HVR supports integrating changes into DB2 for i location. This section describes the configuration requirements for integrating changes (using **Integrate** and **refresh**) into DB2 for i location. For the list of supported DB2 for i versions, into which HVR can integrate changes, see Integrate changes into location in Capabilities.

Pre-Requisites

- The *current schema* (default library) of **User** should exist

- Journaling should be enabled for the *current schema* (so that the table(s) created in the *current schema* are automatically journaled)

Grants to Integrate and Refresh Target

The **User** should have permission to read and change replicated tables

```
grant select, insert, update, delete on tbl to hvruser
```

Alternatively, run the following command from AS/400 console:

```
GRTOBJAUT OBJ(HVR/*ALL) OBJTYPE(*FILE) USER(HVRUSER) AUT(*CHANGE)
```

The **User** should have permission to use the *current schema* (default library) and to create and drop HVR state tables in it

```
grant createin, usage on schema current schema to hvruser
```

Alternatively, run the following command from AS/400 console:

```
GRTOBJAUT OBJ(HVR) OBJTYPE(*CURLIB) USER(HVRUSER) AUT(*CHANGE)
```

Compare and Refresh Source

HVR supports compare and refresh (source location) into DB2 for i location. This section describes the configuration requirements for performing **HVR Compare** and **HVR Refresh** (source location) in DB2 for i location.

Grants for Compare and Refresh Source

The **User** should have permission to read replicated tables:

```
grant select on tbl to hvruser
```

Alternatively, run the following command from AS/400 console:

```
GRTOBJAUT OBJ(HVR/*ALL) OBJTYPE(*FILE) USER(HVRUSER) AUT(*USE)
```