

SOFTWARE RELEASE DOCUMENT (SOFTDOC)

Product:	HPE Shadowbase Compare for SQL
Release:	Gravic Version: 6.220 HPE NonStop Shadowbase: T1122H06-AAC (SB Repl/Guardian)
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NOTE: This release contains updated software for HPE Shadowbase Compare for SQL for the HPE NonStop Integrity Servers only. The next release (version 6.230, T1122H06-AAD) will include the updated software for the HPE NonStop Integrity/X Servers.

NOTE: This softdoc applies to the HPE Shadowbase Compare for SQL product. Other softdocs document the releases of the other components in T1122H06, including:

- HPE Shadowbase Audit Reader,
- HPE NonStop Shadowbase Guardian replication, and
- HPE NonStop Shadowbase OSS replication.

You are advised to reference those other softdocs for the specific changes related to those specific components.

NOTE: This softdoc covers new features and corrected problems for Shadowbase Compare for HPE NonStop Integrity Servers (H06 and J06 series Guardian NonStop operating system versions). This softdoc is available in an Adobe PDF file (.PDF). Softdoc files for SQL Compare are named IPMnnnn-SQL COMPARE.pdf (where nnnn is the Shadowbase version number).

NOTE: HPE Shadowbase Compare for SQL internally uses the nomenclature “CS-SQL-COMPARE” to reflect its original development roots. Hence, you may notice that some examples show commentary reflecting that name.

Table of Contents

SOFTWARE RELEASE DOCUMENT (SOFTDOC).....	1
Table of Contents	2
Special Notes for Version 6.220	3
Changes in Release 6.220	3
New Features in Release 6.220	3
Problems Fixed in Release 6.220	3
New Features Description	5
Compare/Remote Agent Communication Protocol	5
Summary Report Enhancements	6
New and Revised Commands	7
EXPLAIN Command (New).....	7
OUT SUPPRESS Command (New)	9
PAUSE Command (Revised).....	9
SHOW Command (Revised).....	9
SQL Command (New)	10
STOP Command (Revised).....	11
TARGET ADDRESS Command (Revised)	11
New and Modified TACL Parameters	11
Installation Instructions (Shadowbase Compare for SQL)	12
Known Problems Remaining	12

Special Notes for Version 6.220

- 1) Shadowbase NonStop Version 6.220 is only supported on H06.25 and later releases (or the equivalent J series RVUs) for NonStop Integrity Systems.

Changes in Release 6.220

This section summarize the new features and problems fixed since the last General Availability release, Gravic version 6.101 for HPE NonStop Integrity systems and version 6.200 for HPE NonStop Integrity/X servers.

New Features in Release 6.220

- 1) The protocol for TCP/IP based communication between Compare and the Remote Agents has been significantly enhanced for both SQL/MP and SQL/MX, resulting in dramatically increased throughput and dramatically decreased bandwidth utilization. See *Compare/Remote Agent Communication Protocol*, below, for more information.
- 2) New commands to display the query used to select the records for the comparison and the execution plan have been added. See the *EXPLAIN Command (New)* and *SQL Command (New)* sections, below.
- 3) Compare can be configured to stop or pause the comparison after a specified number of rows have been compared. See the *PAUSE Command* and *STOP Command* sections, below.
- 4) The *SHOW* command has been enhanced to include additional information such as target address for configurations that use the Remote Agent. See the *SHOW Command (Revised)* section below for more information.
- 5) The *TARGET ADDRESS* command has been enhanced to allow the remote port to be specified as part of the address. See the *TARGET ADDRESS Command (Revised)* section, below, for more information.
- 6) The summary report has been enhanced to include counts of the number of operations done to correct the file and to include the date, time, and elapsed time of the run. See the *Summary Report Enhancements* section for examples.
- 7) You can now inhibit the logging of differences and changes while still getting periodic *PROGRESSINFO* reports. See the *OUT SUPPRESS Command (New)* section for more information

Problems Fixed in Release 6.220

- 1) A number of installation related issues have been corrected:
 - When running *INSTALMX* and choosing to install the demo, the scripts and files related to the demo were not placed in the location specified by *SQL-*

COMPARE-MX-DEMO-SUBVOL.

- Missing parameters in the install ini files could cause the install process to abend.
- The TSTFILMX program for the SQL/MX demo would not SQL compile successfully if the user specified a catalog different from SQL-COMPARE-MX-CATALOG when installing.
- The INSTALL macro for SQL/MX Compare ignored the catalog location and tried to create it on \$SYSTEM.
- The MP install program did not drop the RUNHIST table when recreating the standard MP tables used by Compare.

2) Error messaging has been improved:

- Compare will now display the message text for SQL errors along with the error codes, which is useful for diagnosing issues.
- In some cases, Compare would log multiple messages for the same error. For example, if you specified a non-existent column in a WHERE condition, Compare would report that error up to four times for the source and target.
- The messaging has been improved for the case when a user that has not be configured tries to run Compare. In prior releases, this caused a misleading message (“*** Error: Configuration error: Param: DETAILS-SUBVOL, Value not configured”) to be logged.

3) In some cases, the results from iterative processing displayed incorrectly.

4) Using a SELECT and DESELECT could cause the comparison run to abort with the following messages:

```
*** Error 0 receiving from remote agent, connection closed.  
*** Error: internal consistency error #4, please notify CS Software GmbH.  
  
Compare run aborted.
```

5) The SAVE command could fail for SQL/MX compares that included INTEGER SIGNED columns.

6) For compare configurations that included multiple “ON” conditions, dropping the ON condition out of order could cause previous versions of Compare to trap.

- 7) FC commands with long command lines could cause previous versions of Compare to trap with an illegal address reference.
- 8) Setting STOP 1 MESSAGES could cause previous versions of Compare to loop, reprocessing the current record, when CONTINUE was issued. If STOP 1 MESSAGES was set and Compare reported a “Column value difference”, issuing a CONTINUE command would result in the same record and difference being reported repeatedly.

New Features Description

Compare/Remote Agent Communication Protocol

The application layer protocol between SQL Compare and the Remote Agent has been significantly enhanced to increase throughput and reduce traffic when compared to previous versions. Previous versions required a round trip to request and retrieve a row, and the full row was returned to the Compare process.

The new protocol is optimized for files that largely match. Instead of requesting a row, SQL Compare now requests a checksum for a block of rows from the Remote Agent on the target system. If the checksum matches with the equivalent block of rows read on the source system, SQL Compare will move on to the next block. Otherwise, it will request the rows to determine the cause of the mismatch.

Figure 1 shows the logic for the flow between Compare and the Remote Agent. This can be summarized in the following steps:

- 1) Compare requests the checksum for the block of records. The number of records used to calculate the checksum is dynamic: Compare will adjust the block size up if there are few mismatches and will adjust it down if there are many. The algorithm is designed to work most effectively for files that have few mismatches.
- 2) The Remote Agent reads the records from the target table, calculates the checksum, and returns it to Compare.
- 3) Compare checks the target checksum from the Remote Agent against the checksum it calculated from the source table’s records. If they match, it continues with the next set of records.
- 4) If the checksums did not match, Compare requests row information from the Remote Agent for each row in the block.
- 5) The Remote Agent returns information for each row in the set used to calculate the checksum. The information returned includes the key column values and a checksum for the non-key (data) columns.

- 6) Using the row information returned by the Remote Agent, Compare determines which rows are different.
- 7) Compare will request full row information for rows whose data column checksums don't match and for rows that are in the target but not in the source.
- 8) The Remote Agent returns the information for the requested rows.
- 9) Compare processes the mismatch rows, and then moves on to the next set of rows to be processed.

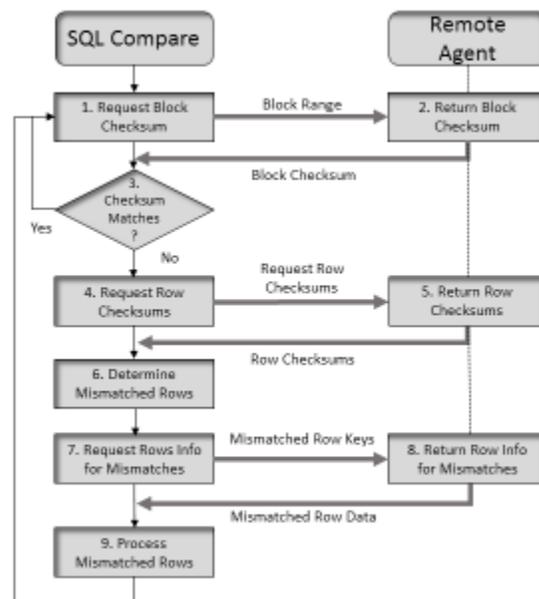


Figure 1 - Communication Flow Chart

This algorithm results in very efficient processing between systems, allowing the mismatches to be quickly identified and processed while minimizing network traffic.

Note that the definition of which table is the source vs which table is the target can be switched by reversing the “polarity” of where the Compare operation is executed. Hence, place the SQL Compare processing on the node/environment where you want most execution cycles to occur, and the Remote Agent on the node/environment where you want fewer execution cycles to occur.

Summary Report Enhancements

The summary report has been enhanced to include the number of fix up operations, date and time of the run, and the elapsed time of the run. Sample output (without fixup):

```
----- Primary compare run finished.
Source: \GRAVIC1.$DATA9.JRHSRC.MPTABLE
Target: \GRAVIC1.$DATA9.JRHTGT.MPTABLE

Number of source records read:      1771100
Number of target records read:      1771100
Total differences                   :      71117
Column value differences             :      71117
Source not found                    :           0
Target not found                    :           0
Tables are not equal!

Start                               :      2016-04-06 15:51:23
Finished                            :      2016-04-06 15:53:25
Duration                            :      00:02:02.531275
```

Sample run with fixup:

```
COMPARE>START
Start                               :      2016-04-07 14:39:09
----- Primary compare run finished.
Source: \GRAVIC1.$DATA9.JRHSRC.MPTAB2
Target: \GRAVIC1.$DATA9.JRHTGT.MPTAB2

Number of source records read:      6
Number of target records read:      6
Total differences                   :           0
Column value differences             :           3
Source not found                    :           2
Target not found                    :           1
Updates executed                    :           3
Inserts executed                    :           1
Deletes executed                    :           2
Tables are equal!

Start                               :      2016-04-07 14:39:09
Finished                            :      2016-04-07 14:39:09
Duration                            :      00:00:00.366540
New and Modified Commands
```

New and Revised Commands

This section documents new and revised commands since the last General Availability release.

EXPLAIN Command (New)

The EXPLAIN command has been added to display the execution plan for the queries that select data for comparison. The syntax is

```
EXPLAIN
```

The execution plan for the queries will be display on the screen:

OUT SUPPRESS Command (New)

The OUT SUPPRESS command also you to suppress (or not suppress) logging of differences and actions during a compare run. If suppression is enabled, only PROGRESSINFO, ON ... PRINT, and end of run messages will be logged on the terminal or in the OUT file. All others will be suppressed. The syntax is:

```
OUT SUPPRESS ON
OUT SUPPRESS OFF
```

OUT SUPPRESS ON suppresses the messages, OUT SUPPRESS OFF enables the messages. Messages are enabled by default.

PAUSE Command (Revised)

The PAUSE command has been modified to add the option of pausing compare processing after a specified number of rows are compared. The syntax of the PAUSE command is

```
PAUSE <n> LINES
PAUSE <n> MESSAGES
PAUSE <n> RECORDS
```

Output to the screen will be paused after:

- the specified number of differences have been reported (PAUSE <N> MESSAGES>),
- the specified number of lines have been printed to the terminal (PAUSE <N> LINES>), or
- the specified number of rows have been read and compared (PAUSE <N> RECORDS>).

The tool will then prompt with the following message:

```
PAUSE (c = continue, x = abort)>
```

If you press c or C the comparison will be continued. If you press x or X the compare operation will be stopped and Compare will be available for new commands. This command is similar to the STOP command.

SHOW Command (Revised)

The show command now includes additional information, including the target address. The syntax is:

SHOW

Sample output:

```
COMPARE>target address 10.1.50.80:1954
COMPARE>show
Source table  :\GRAVIC1.$DATA9.JRHSRC.MPTAB2
Remote Target :10.1.50.80:1954
Target table  :\GRAVIC1.$DATA9.JRHTGT.MPTAB2
Selected compare columns:
Source                Target
-----
COL                   COL
COL2                  COL2

Iterations:          10
Progressinfo:        1000
Terminal output:     ON
Performance measurement: OFF
```

SQL Command (New)

The SQL command displays the SQL statements used to select the data for comparison.
The syntax is:

SQL

The queries to select the data to be compare are displayed on the screen:

```
COMPARE>sql
=====
Source
=====
SELECT COL,
        COL2,
        PK
FROM \GRAVIC1.$DATA9.JRHSRC.MPTABLE
ORDER BY PK
BROWSE ACCESS;
=====
Target
=====
SELECT COL,
        COL2,
        PK
FROM \GRAVIC1.$DATA9.JRHSRC.MPTABLE
ORDER BY PK
BROWSE ACCESS;
COMPARE>
```

STOP Command (Revised)

The STOP command has been modified to add the option of stopping compare processing after a specified number of rows are compared. The syntax of the STOP command is:

```
STOP <n> LINES  
STOP <n> MESSAGES  
STOP <n> RECORDS
```

Output to the screen will be stopped after:

- the specified number of differences have been reported (STOP <N> MESSAGES>),
- the specified number of lines have been printed to the terminal (STOP <N> LINES>), or
- the specified number of rows have been read and compared (PAUSE <N> RECORDS>).

Once the limit has been reached, Compare will be available for new commands. This command is similar to the PAUSE command.

TARGET ADDRESS Command (Revised)

The target address command has been enhanced to allow the port number to be specified. The syntax is:

```
TARGET ADDRESS <IP Address>[:<Port>]  
TARGET ADDRESS NONE
```

The first form specifies the address used to connect to the Remote Agent. <IP Address> can be a IPv4 dotted address or the host name. You can optionally append the Port used by the Remote Agent to the address.

If the port is not specified, Compare will look for the PORT (SQL/MP) or PORTMX (SQL/MX) TACL parameter. If the TACL parameter is not specified, Compare will use its default port value.

TARGET ADDRESS NONE clears the target address so that the Remote Agent will not be used for comparisons.

New and Modified TACL Parameters

None.

Installation Instructions (Shadowbase Compare for SQL)

1) Transfer the HPE Shadowbase Compare for SQL installation files to the host system using FTP or any other file transfer product capable of transferring ASCII and binary files. Binary transfer the SQLCMPR file from your PC (if you obtained the files from a Gravic FTP site) or DVD. Then ASCII transfer the OINSTARX, OINSTLMP, OINSTLMX, and OINSTLRA files from the same location.

2) To begin the installation process, obey the OINSTARX, OINSTLMP, OINSTLMX, and OINSTLRA files to unpack the installation files for the desired HPE Shadowbase Compare for SQL component(s):

OBEY OINSTARX to unpack the installation components for the SQL/MX Remote Agent.

OBEY OINSTLMP to unpack the installation components for the SQL/MP Compare program, SQLCMPE.

OBEY OINSTLMX to unpack the installation components for the SQL/MX Compare program, SQLCMPMX.

OBEY OINSTLRA to unpack the installation components for the SQL/MP Remote Agent.

3) Follow instructions in the Installation section of the *HPE Shadowbase Compare for SQL Manual*. Each component has an installation INI file that must be edited with the desired system specific settings before the corresponding installation program is run.

Known Problems Remaining

1) Due to a SQL/MP issue, negative intervals with absolute values greater than 69535 days (190 years) are not supported by SQLCMPE. Attempting to compare tables including these values will result in a SQL Error -8425 during fetch of cursor.

2) ON END EQUAL and ON END NOT EQUAL processing will not occur if ON END processing is also specified.

3) Unprintable character values in character fields may cause issues when listed.

4) If you specify different subvolumes for the demo (SQL-COMPARE-DEMO-SUBVOLUME) and the compare program parameter (SQL-COMPARE-PROGRAM-SUBVOLUME), INSTALL will fail to SQL compile the TSTFILE program. As a workaround, either use the same subvolume for the demo and compare programs, or manually SQL compile the TSTFILE program.

- 5) The HELP command is missing several of the new commands. Refer to the documentation above for information on the new commands.
- 6) The MP Remote Agent install will trap with an illegal address reference error if there are missing parameters in the INSRINI file.
- 7) In some cases, the output buffer is not cleared after an error message is generated. As a result, the message is erroneously repeated after other operations. Restarting Compare will clear the message.

In the example below, the first attempt to save the compare session failed and the “RUN not saved” message was erroneously printed before subsequent prompts:

```
$QA MPCMPRUN 129> sqlcmpe
COMPARE SQL/MP - T1122H06 - V6.220 - (01Apr2016),
COPYRIGHT CS SOFTWARE GMBH AND GRAVIC, INC. 2003-2016.
PORTIONS COPYRIGHTED BY AND LICENSED FROM THIRD PARTIES SEE README FILE.
USAGE SUBJECT TO THE TERMS OF A WRITTEN LICENSE AGREEMENT.

COMPARE>source cjcdata.oinfTAB1
COMPARE>target cjcdata.oinfTAB2
COMPARE>stop 1 messages
COMPARE>checkpoint 1
COMPARE>progressinfo 0
COMPARE>start
Start                :                2016-04-06 17:05:00
*** Error: CHECKPOINT specified with a checkpoint number > 0 but RUN not saved.
    Either save the run or set CHECKPOINT 0.
    Compare run not startable.
COMPARE>save test-run
*** Error: RUN named test-run already in database,
    please use new name or delete old first.
    RUN not saved.
COMPARE>save oinfTEST
RUN oinfTEST saved.
COMPARE>start
Start                :                2016-04-06 17:05:15

---> Source record not found for key <-----
AKEY                  : 1
    RUN not saved.
COMPARE>continue

---> Difference(s) found for key <-----
AKEY                  : 5

Source Column STRING2 = bb
Target Column STRING2 = zz
    RUN not saved.
COMPARE>continue

---> Target record not found for key <-----
AKEY                  : 10
----- Primary compare run finished.
Source: \GRAVIC1.$QA.CJCDATA.OINFNTAB1
Target: \GRAVIC1.$QA.CJCDATA.OINFNTAB2

Number of source records read:          10
Number of target records read:          9
Total differences                   :      3
Column value differences             :      1
Source not found                     :      1
Target not found                      :      1
Tables are not equal!

Start                :                2016-04-06 17:05:15
Finished              :                2016-04-06 17:05:29
Duration              :                00:00:13.805545
```

- 8) Using INSERT() (incorrect format) instead of the correct INSERT(*) in “ON” actions caused Compare to trap when the action was performed. For example:

```

COMPARE>load SCR8984
RESET
SECURE NNNN
SOURCE "\GRAVIC1.$DATA9.JRHSRC.MPTAB2"
TARGET "\GRAVIC1.$DATA9.JRHTGT.MPTAB2"
COMPARE>ON DIFF(*) DO UPDATE TARGET;
Syntax error!
COMPARE>ON DIFF(*) DO UPDATE TARGET();
COMPARE>ON SOURCE NOT FOUND DO DELETE;
COMPARE>ON TARGET NOT FOUND DO INSERT();
COMPARE>start
Start                               :                2016-04-07 14:14:22
***** INSERT INTO TARGET FROM SOURCE *****
PK                                   : 1
\GRAVIC1.$X5SQ:672110185 - *** Run-time Error 002 ***
\GRAVIC1.$X5SQ:672110185 - Illegal address reference
\GRAVIC1.$X5SQ:672110185 - From ---
\GRAVIC1.$X5SQ:672110185 -      sc_sc_act_check_upd_xy + 0x61 (UCr)
\GRAVIC1.$X5SQ:672110185 -      cs_sc_act_update_ts + 0x90 (UCr)
\GRAVIC1.$X5SQ:672110185 -      cs_sc_act_do_single + 0x6E0 (UCr)
\GRAVIC1.$X5SQ:672110185 -      cs_sc_act_do + 0xA0 (UCr)
\GRAVIC1.$X5SQ:672110185 -      cs_sc_act_interpret + 0x520 (UCr)
\GRAVIC1.$X5SQ:672110185 -      cs_sc_act_do_diff_actions + 0x1F0 (UCr)
\GRAVIC1.$X5SQ:672110185 -      cs_sc_cmp_compare + 0xAD0 (UCr)
\GRAVIC1.$X5SQ:672110185 -      cs_sc_cmp_do_compare + 0x1FE0 (UCr)
\GRAVIC1.$X5SQ:672110185 -      yyparse + 0x1ED0 (UCr)
\GRAVIC1.$X5SQ:672110185 -      main_common + 0x420 (UCr)
\GRAVIC1.$X5SQ:672110185 -      main + 0x60 (UCr)
\GRAVIC1.$X5SQ:672110185 -      _MAIN + 0x80 (UCr)
  Save file \GRAVIC1.$DATA9.JRHCOMP.ZZSA0097 created for process 1,818 ($X5SQ)
ABENDED: $X5SQ
CPU time: 0:00:00.061
3: Premature process termination with fatal errors or diagnostics

```

- 9) The EXPLAIN command may fail for extremely large SQL statements. In the example below, the statement size was just under 60,000 characters. Most of the statement has been redacted for brevity.

```

COMPARE>EXPLAIN
*** Error during PREPARE of statement
"SELECT      "C1CH",          "C2CHO",          "C3CH",          "C4VC",

<large part of statement cut for brevity>

COIK" FROM    "QASRC"."SQLCOMPARE"."SDKEYTABL" ORDER BY
"COIK" BROWSE ACCESS;"
*** SQLCODE = -15001
Table and column = .
Error codes     = -15001/42000/0
Error text      = *** ERROR[15001] A syntax error occurred at or before:
... JULIANTIMESTAMP((TIMESTAMP '1900-01-01 00:00:00.000000') + CAST(MOD(CAST(EXTRACT(MINUTE FROM "C51IVNF") AS LARGEINT), 1440) AS INTERVAL MINUTE(18)) + CAST(EXTRACT(SECOND FROM "C51IVNF") AS INTERVAL SECOND(2,6))), "C52IVHF", CAST(EXTRACT(HOUR FROM "C52IVHF")/24 AS INTERVAL DAY(18)), JULIANTIMESTAMP((TIMESTAMP '1900-01-01 00:00:00.000000') + CAST(MOD(CAST(EXTRACT(HOUR FROM "C52IVHF") AS LARGEINT), 24) AS INTERVAL HOUR(18)) + CAST(EXTRACT(MINUTE FROM "C52IVHF") AS INTERVAL MINUTE) + CAST(EXTRACT(SECOND FROM "C52IVHF") AS INTERVAL SECOND(2,6))), "C53DF", CAST(EXTRACT(DAY FROM "C53DF") AS INTERVAL DAY(18)), JULIANTIMESTAMP((TIMESTAMP '1900-01-01 00:00:00.000000') + CAST(EXTRACT(HOUR FROM "C53DF") AS INTERVAL HOUR) + CAST(EXTRACT(MINUTE FROM "C53DF") AS INTERVAL M;
^ (4095 characters from start of SQL statement)
Table and column = .
Error codes     = -8822/X08MU/0
Error text      = *** ERROR[8822] The statement was not prepared.

```

***** *End of Document* *****