IBM InfoSphere Optim for z/OS
Version 11 Release 3

Compare Introduction

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Note
Before using this information and the product it supports, read the information in "Notices" on page 39.

Version 11 Release 3

This edition applies to version 11, release 3 of IBM InfoSphere® Optim for z/OS and to all subsequent releases and modifications until otherwise indicated in new editions.

Contents

About this publication

This document contains an overview of Compare and demonstrates key product features. You can use this document as a tutorial. The scenarios discussed are based on the sample database distributed with the Optim™ solution.

For detailed information, refer to the *Compare User Manual*.

Chapter 1. Overview

IBM® Optim for z/OS® manages enterprise data throughout every stage of the information lifecycle. The Optim solution enables you to assess, classify, subset, archive, store, and access enterprise application data. The solution uses the relationships defined in the database, where available, and supplements these relationships with those defined in the Optim Directory.

The Optim solution runs as a TSO/ISPF application and incorporates familiar ISPF commands. The solution handles any number of tables and any number of relationships, regardless of the complexity. The Optim components include Access, Archive, Compare, and Move.

Creating and maintaining an IBM DB2® test environment can take almost as much time and energy as developing the DB2 application itself. To fully test an application, the test database must contain a representative sample of related rows from multiple tables. Then, specific test cases and special test cases must be included. After executing the application, the results must be verified by comparing the original test data with the data after application execution. For a complete comparison, all differences must be identified–not just row to row but related rows to related rows. The Optim solution facilitates this process by automating extracting, copying, editing, browsing, and comparing related data. The solution is based on a unique relational architecture that understands and manages sets of related data stored in multiple DB2 tables.

DB2 application development requires thorough testing. Without it, you can never be sure your application performs as expected. To achieve a high standard of testing

- You need a consistent set of test data as your starting point—a "snapshot" of the test database before you execute the application. You compare this snapshot with the "after" version of the test database.
- You need to verify not only the changes on a row-by-row basis, but the complete set of related changes. For example, if the application changes a row in one table, you must know the impact on the related data.

Only Compare addresses these issues. It compares two versions of relationally intact data from multiple tables. Thus, you can compare the "before" image of the test database with the "after" image in one execution. Also, since Compare identifies rows in dependent tables that have related changes as well as the differences in rows between tables, you obtain a full analysis of the results of the application. A full-function, browse facility is provided with Compare to enable you to evaluate the compared data online quickly and easily. Using this facility you can direct your attention to the differences in the data.

Other Optim Components

In addition to Compare, Optim includes the following components:

Access
Access is a relational facility that lets you browse and edit related data residing in multiple DB2 tables. Use Access to verify the presence of test cases and to create additional test cases. See the *Access User Manual* for detailed information.

Archive
Archive is a relational archiving facility that allows you to identify and archive sets of relationally intact data before removing selected data from your database. Archived data is indexed and stored. You can browse, search, or restore selected subsets of archived data. See the *Archive User Manual* for detailed information.

Move Move is a relational copy facility that extracts and copies relationally intact sets of data to assist in the creation and maintenance of test data. See the *Move User Manual* for detailed information.

A Sample Session

This document explores a sample session to highlight the key facilities provided with Compare. For this sample session, assume you are working on enhancements to an application and proceed through the following steps:

Note: The table names in the sample scenario are shown without the OPTIM_ prefix. To use the scenarios, prefix the table names with OPTIM_

1. Test your work by executing the application against a test database.
2. After execution, compare the "before" image with the "after" image to identify the changes.
3. Browse the differences as sets of related rows.

Compare is uniquely designed for this task. Using Compare, you simply

- Specify the two sets of source data to be compared. This is the Compare Definition.
- Execute the Compare Process. This is the actual comparison step. The results of the Compare Process are stored in a Compare File.
- Review the results. You can browse the Compare File online or generate a report.

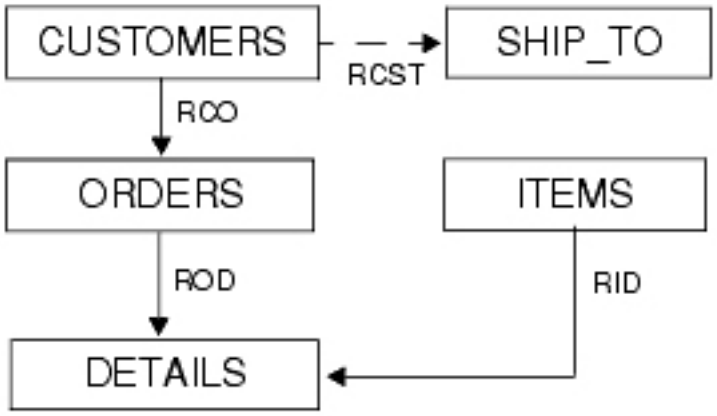
Sample Database

The sample database distributed with Optim is used for the examples in this manual.

This database includes the following tables (names are prefixed with the Creator ID FOPDEMO).

- OPTIM_CUSTOMERS
- OPTIM_ORDERS
- OPTIM_DETAILS
- OPTIM_SALES
- OPTIM_FEMALE_RATES
- OPTIM_SHIP_INSTR
- OPTIM_ITEMS
- OPTIM_SHIP_TO
- OPTIM_MALE_RATES
- OPTIM_STATE_LOOKUP

Only five of these tables are used in the examples. The following chart shows the tables and the DB2 relationships between those tables. (RCST is a user-defined Optim relationship between OPTIM_CUSTOMERS (parent) and OPTIM_SHIP_TO (child) stored in the Optim Directory. The arrows indicate the flow from parent to child. (The OPTIM_ prefix for each table name is not shown in the chart.)



The data and the relationships in the sample database may have been modified during other Optim product training functions.

Sample Extract File

An Extract File is used as one source in the examples. This Extract File is distributed with Compare. The Extract File contains data previously extracted from the database and stored in a sequential file. (In this manual, the file is referred to as FOPDEMO.EXTRACT. Check with site management for the name assigned at your site.)

Assigning the “Before” and “After” Images

When evaluating the execution of an application, users normally compare the “before” image with the “after” image. For this scenario, the Extract File is used as Source 1 or the “before” image of the database. The distributed database is used as Source 2 or the “after” image.

Comparing the distributed Extract File with the distributed sample database generates examples of the types of differences in the data you may encounter and demonstrates that Compare identifies them all.

Chapter 2. Begin the Session

The Compare session begins with the **Main Menu**. The following figure shows the Main Menu when Access, Archive, and Move are also installed.

```
---------------------------- IBM's InfoSphere Optim ---------------------------
OPTION  ===>

0  OPTIONS         - Site and User Options      SQLID  ===> FOPDEMO
1  BROWSE TABLE    - Browse a DB2 Table         SUBSYS ===> TDB2
2  EDIT TABLE      - Edit a DB2 Table           LOCATION ===>
3  BROWSE USING AD - Browse DB2 Tables Using Access Definition
4  EDIT USING AD   - Edit DB2 Tables Using Access Definition
5  ADS             - Create or Modify Access Definitions
6  DEFINITIONS     - Maintain InfoSphere Optim Definitions (Keys, Maps, ...)
7  MIGRATION       - Data Migration - Extract, Insert, Update, ...
8  COMPARE         - Compare Two Sets of Data
9  ARCHIVE         - Archive and Restore Data

T  TUTORIAL        - Information About IBM's InfoSphere Optim
C  CHANGES         - Changes from Prior Release(s)
X  EXIT            - Terminate Product Use
P  LICENSING       - Product Licensing Modification
```

Figure 1. Main Menu

The panel prompts for an SQLID and a DB2 subsystem, SUBSYS. These are site-specific values. The DB2 subsystem must be supplied the first time you log on to Compare. These values are profiled. (If remote access is available, a LOCATION prompt is displayed for the remote location.)

Panel Options

The **Main Menu** options are:

0 OPTIONS
Specify product options, including site, user, editor and display, job card, and Compare options.

1 BROWSE TABLE
Use Access to browse data from a DB2 table.

2 EDIT TABLE
Use Access to edit data from a DB2 table.

3 BROWSE USING AD
Use Access to browse data from DB2 using an Access Definition.

4 EDIT USING AD
Use Access to edit data from DB2 using an Access Definition.

5 ADS
Create and maintain Access Definitions.

6 DEFINITIONS
Define and maintain Optim primary keys, relationships, Access Definitions, Column Maps, Table Maps, Legacy Tables, IBM IMS™ Environment Definitions, and IMS Retrieval Definitions, and Archive Collections, or invoke utilities to export and import these objects.

7 MIGRATION
Perform the Move processes for extracting, inserting, loading, creating, converting, and browsing DB2 or Legacy data, or the Compare processes for extracting and browsing data.

8 COMPARE
Use Compare to compare two sets of related data and browse the results.

9 ARCHIVE
Perform the Archive processes for archiving data, browsing and searching the archives, and selectively restoring archived data.

T TUTORIAL
Display the online Tutorial.

C CHANGES
Display the enhancements for the current release.

X EXIT
Terminate the session.

P LICENSING
Display a list of the Optim components and their status (In Evaluation, Permanently Licensed, Disabled).

This information focuses on Option 8 COMPARE; therefore, specify 8 at the OPTION prompt. (This example executes the Compare Process online. However, if you intend to execute the Compare Process in batch, select Option 0 OPTIONS and specify the necessary job card information on the Job Card and Print Options panel displayed using Option 3 JOBCARD on the **Choose Option Type** menu.)

Additional Information

For more information about the other options available for Compare, see the *Compare User Manual*. For information about the Access, Archive, or Move menu options, refer to the appropriate user manual. Many of the **Main Menu** options are available for all or most Optim components; refer to the *Common Elements Manual* for information about these common options.

Chapter 3. Specify the Data to Compare

Select Option 8 COMPARE on the **Main Menu** to specify the data to be compared and to perform the comparison. The **COMPARE Process** menu is displayed.

```
----------------------------- COMPARE Process ---------------------------------
OPTION  ===>
                                              SQLID  ===>
1  SINGLE   - Compare One Table to Another     SUBSYS ===>
2  MULTIPLE - Compare Two Sets of Tables       LOCATION ===>
3  PERFORM  - Specify COMPARE Parameters and Perform COMPARE

B  BROWSE   - Browse Results of Previous COMPARE
R  REPORT   - Generate Report from Previous COMPARE

Type of Compare Definition to Use for COMPARE ===> T  (P-Perm, T-Temp)

If Permanent, Specify New or Existing Compare Definition Name:
  GROUP  ===>
  USER   ===>
  NAME   ===>

Use '_' for DB2 LIKE Characters ===> N  (Y-Yes, N-No)
```

Figure 2. COMPARE Process Menu

Before you specify the data to be compared, indicate whether you are going to compare two versions of a single table or two versions of a set of tables. There are advantages to both.

Single Table

When you compare two versions of a single table, Compare provides a quick path. You only need to specify the source for each version of the table and a destination to store the results of the comparison. Relationships are not involved, so only direct changes (changes to a row) are identified. This is useful, for example, when you need to review changes to a reference table.

Multiple Tables

When comparing data in multiple tables, you still specify the source and the destination of the results, but there are other considerations. If the data is to be extracted, you must specify:

- The names of the tables
- The relationships and traversal paths to determine the set of data.

This information is critical for reviewing the complete set of changes resulting from application execution. After the data is specified and, if necessary, extracted, the two sets are compared to identify and mark the changes. Changes to rows in a table are “direct.” Changes to rows in a dependent table are “related.” Anomalies, such as duplicate keys and orphan rows, are also identified and marked.

Compare Definition

The specifications for a Compare Process are called a Compare Definition. A Compare Definition can be designated as permanent or temporary. A permanent Compare Definition is stored in the Optim Directory and is available for later reuse. To store it, however, you must specify a name for the Compare Definition.

A temporary Compare Definition is available for the current Compare Process only, and then it is discarded, so a name is not required for the Compare Definition. This sample session uses a temporary Compare Definition. Specify "T" for the prompt **Type of Compare Definition to Use for COMPARE** to use a temporary Compare Definition.

Specify Compare Source Types

In this sample session, select Option 2 MULTIPLE to compare sets of tables. The following panel is displayed to prompt for the type of source for each set of the data.

```
-- Specify COMPARE Source Types: TEMPORARY CD --------------------------------
Command ===>

COMPARE can process data saved in an Extract File or in DB2 Tables.
Specify source types as follows:

   Source 1 ===> 1    1 - Extract File
                      2 - Set of Data Defined by an Access Definition

   Source 2 ===> 3    1 - Extract File
                      2 - Set of Data Defined by an Access Definition
                      3 - All Rows from Multiple DB2 Tables
```

Figure 3. Specify COMPARE Source Types

Throughout, the sources are identified as Source 1 and Source 2. For this sample session:

Source 1
An Extract File. The Extract File contains the original data that was used to create the test database – "before" data.

Source 2
All Rows from Multiple DB2 Tables. Source 2 identifies the test database against which the application was executed – "after" data.

Possible Source Types

For both Source 1 and Source 2, you can use data previously extracted and stored in an Extract File, or you can define the data to be extracted for the comparison using an Access Definition. (An Access Definition is the specification for a set of related data.)

If you specify an Access Definition as the source, you can use an existing Access Definition and edit it (if needed), or you can create a new Access Definition. To create a new one, specify a unique name and the panels for defining an Access Definition are automatically displayed. Also, any editing of the Access Definition can be specified as permanent or "local" (specific to the Compare Definition). You can modify or create an Access Definition to be stored (permanent) or for a single Compare Process (local).

An additional choice for Source 2, All Rows from Multiple Tables, is available to specify that all rows from the tables defined for Source 1 are to be extracted. This is useful when comparing "before" and "after" images of a test database because:

- The table names for Source 1 are automatically included for Source 2. You do not have to respecify the data for the source.
- All rows are extracted from the database for Source 2. This enables the Compare Process to evaluate the entire test database. The resulting comparison identifies all inserted, deleted, changed, duplicate, and orphan rows.

As with this sample session, you can retain the Extract File used to create the test database, execute your application, and then compare the Extract File with the test database.

Specify Compare Sources

After specifying the Source Types, Compare prompts for any required additional information about each source. For example, if an Extract File or an Access Definition is a source, the name is required.

For this sample session, the following panel is displayed prompting for the name of an Extract File.

```
-- Specify COMPARE Sources: TEMPORARY CD --------------------------------------
Command ===>                                                 SCROLL ===> PAGE

Source 1: Extract File
  DSN ===> 'FOPDEMO.EXTRACT'

Source 2: All Rows from Multiple DB2 Tables
  COMPARE will initially use matching Table Names from the above
  Extract File for the Table Map
```

Figure 4. Specify COMPARE Sources - Session Overview

Source 1: Extract File

Specify the data set name of the Extract File. For this sample session, assume the Extract File named FOPDEMO.EXTRACT has been created. This is an Extract File distributed with Compare. (Check with site management for the full name.)

Source 2: All Rows

After the information needed for Source 1 has been supplied, specify Source 2. Since the data for Source 2 has been specified as **All Rows from Multiple DB2 Tables**, you are not prompted for additional specifications. In this case, Compare assumes that the names of the tables specified in Source 1 are to be used as Source 2.

Map Source 1 and Source 2 Tables

After you have specified Source 1 and Source 2, Compare prompts you to specify a Table Map. A Table Map is used to specify which tables are to be compared by associating a Source 1 table with a Source 2 table.

The tables may have different names and any Source 1 table not associated with a Source 2 table is not included in the comparison. For this scenario, the Source 2 tables have the same names, and all tables are to be compared.

```
----------------------- COMPARE Process Table Map -----------------------------
Command ===>                                                 Scroll ===> PAGE

Available Commands: APPLY,SAVE,LIST,MAP,POPULATE,ACM,CLEAR,MKEY, END when Done
Source 2 May be any DB2 Tables or Views
 Src 1 CID: FOPDEMO                                        Column
 Src 2 CID: FOPDEMO                                    >>  Map ID ===>

 Source 1 Table Name      Source 2 Table Name      Type   Column Map or "LOCAL"
-------------------- ------------------------>> ------- --------------------
*********************************** TOP ************************************
CUSTOMERS            CUSTOMERS                  TABLE
ORDERS               ORDERS                     TABLE
DETAILS              DETAILS                    TABLE
ITEMS                ITEMS                      TABLE
SHIP_TO              SHIP_TO                    TABLE
********************************** BOTTOM **********************************
```

Figure 5. COMPARE Process Table Map

Source 1 Values

Different rules are used to populate the **CID** (default Creator ID) and **Table Name** values, based on the source types. For Source 1, **CID** is populated with the default Creator ID from the Extract File or Access Definition. In addition, all table names from the Extract File or Access Definition are listed as the Source 1 tables. These values are all protected.

Source 2 Values

For Source 2, if the source type is an Extract File or Access Definition, then **CID** is populated appropriately from the named source. The **Table Name** values are populated with only the table names from Source 2 that are the same as table names in Source 1. These matching names are placed as the counterparts to the Source 1 tables. The remaining values are blank.

If the Source 2 type is All Rows from Multiple DB2 Tables (as in this example), then **Src 2 CID** is filled with the same Creator ID as **Src 1 CID**. The Table **Name** values are populated with the same values as their Source 1 counterparts. (This is appropriate for the scenario, since the “before” and “after” versions of the same database are to be compared.)

Specifying CID

If Source 2 is All Rows, you can overtype the CID as desired. The value specified for the CID is used as the Creator ID for any listed table for which an explicit Creator ID is not supplied. For this sample session, assume the default Creator ID is FOPDEMO.

Selecting Table Names

Although not necessary in this scenario, you can edit the table names directly or request a selection list of available tables not currently mapped as Source 2. When editing names, you can use the CLEAR command to remove all Source 2 names before typing names on the panel. You can also prefix or suffix the Source 2 names with a string of your choice.

Use the LIST TABLES command to display the selection list of tables. You map the Source 2 tables to their Source 1 counterparts by specifying the number assigned to the table on the panel, as shown in the following example. (In this example, the LIST TABLES command used the default Creator ID, but when you enter the command you can specify DB2 LIKE syntax for the Creator ID or table name to limit the selection list.) For the following figure, assume that *no tables* are specified for Source 2 when the LIST

TABLES command is entered. All tables are included on the selection list.

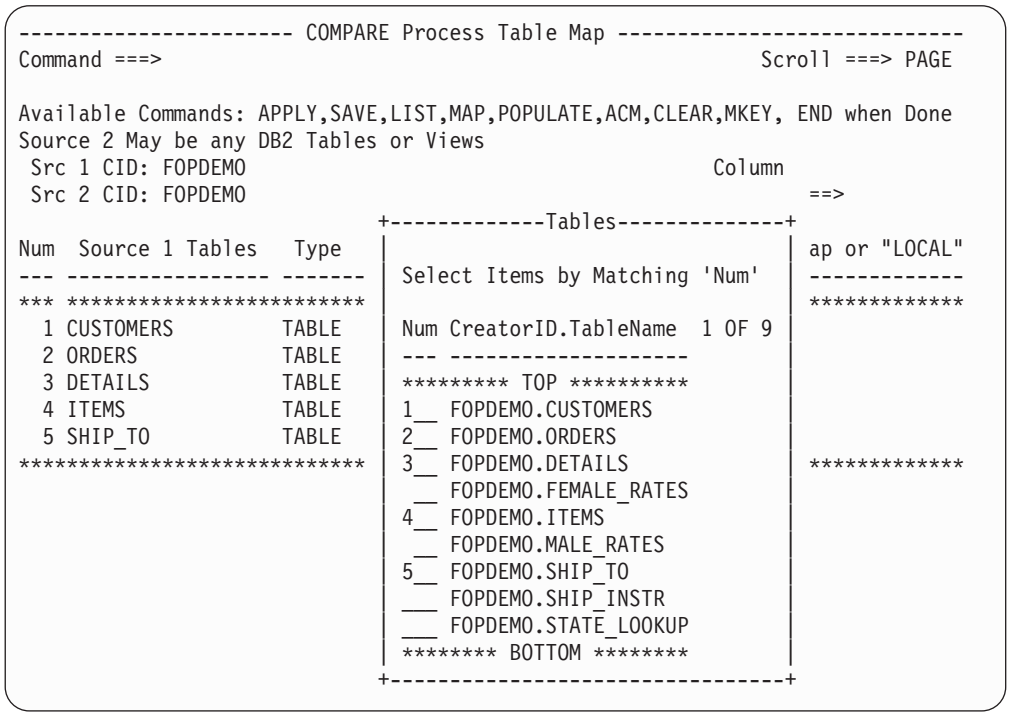


Figure 6. Matching Tables on COMPARE Process Table Map

Using an Existing Table Map

You can replace the initial table names with an existing Table Map. The APPLY command overlays all or part of the displayed Table Map with the specifications from a stored Table Map.

You can store the Table Map you are defining by specifying a name with the SAVE command (e.g., SAVE FOPDEMO.TBLMAP). Then, rather than re⌂enter the specifications when you execute another Compare Process for these tables, you can use the APPLY command to insert the same specifications in a single step. (If you do not explicitly SAVE the Table Map, it is only available for the current Compare Definition.)

Column Map

In addition to Table Maps, you can specify Column Maps to define which columns should be compared when they do not have matching names and which columns should be eliminated from the comparison. The mapped columns must have compatible data types. You can define a Column Map for the current Compare Definition only (referred to as LOCAL) or a Column Map that is stored in the Optim Directory and is reusable.

For this sample session, the tables and column names are the same. All tables and columns are compared. Column Maps are not used.

When the Table Map specifications are complete, use END to proceed.

Chapter 4. Execute the Compare Process

After you have specified sets of data to be compared and selected the relationships to be used for the comparison, the Specify Compare Parameters and Execute panel is displayed. (This panel is also displayed when Option 3 PERFORM is selected on the **COMPARE Process** menu to re-execute an existing Compare Definition.)

```
------------------- Specify COMPARE Parameters and Execute --------------------
Command ===>                                                 SCROLL ===> PAGE

Compare File DSN ===> 'FOPDEMO.SAMPLE.COMPARE'

Source 2 Extract Options:
  Limit Number of Extract Rows   ===>           (1-4294967295,Blank/SL)
  Extract Data using             ===> D         (D-DB2,I-IBM High Perf Unload)

Compare Options:
  Generate Report After Process  ===> N         (Y-Yes, N-No)
  Run Process in Batch or Online ===> O         (B-Batch, O-Online)
    If Online, Invoke Browse     ===> Y         (Y-Yes, N-No)
    If Batch, Review or Save JCL ===> R         (N-No, R,Review, S-Save)
```

Figure 7. Specify COMPARE Parameters and Execute

Compare File DSN

Specify the name of a sequential file that is to contain the results of the comparison. This is the Compare File. If the file you name does not exist, Compare will prompt for allocation information and automatically allocate the file. The Compare File for this sample session is named 'FOPDEMO.SAMPLE.COMPARE'.

Compare Options

There are several Compare Process options. These include:

- Limit the number of rows of data to be extracted if one or both sources are DB2 tables.
- Specify whether or not a report is generated.
- Specify online or batch execution. If online, you can specify whether the results of the comparison are automatically displayed in a browse session when the Compare Process is completed.

If the data from one or both sources must be extracted for the Compare Process (in this example, Source 2 must be extracted), you are prompted to specify a maximum number of rows to be extracted for the source. You can specify any value from 1 through the site limit that is displayed on the panel, or leave this blank to automatically default to the site limit. (Additional prompts are displayed only when pertinent. For example, if an unload program is available, you can specify whether it is to be used.)

Compare Process Steps

When you have finished specifying the options, press Enter. The Compare Process performs the following steps:

1. Retrieve data for Source 1. If Source 1 is an Access Definition, the data is extracted. If Source 1 is an Extract File, the data has already been extracted and is available. (In this sample session, Source 1 is an Extract File.)

2. Retrieve data for Source 2. If Source 2 is an Access Definition or All Tables, the data is extracted. If Source 2 is an Extract File, the data has already been extracted and is available. (In this sample session, Source 2 is All Tables and the data will be extracted.)
3. Compare the data in each pair of tables to determine the equal rows, changed rows, unmatched rows, and duplicate rows.
4. Traverse the relationships to determine the related changes and orphan rows and propagate the information for related changes.

Status information is displayed as the process executes. This information notes which step is currently being performed. The information is updated as each table is extracted, as each pair of tables is compared, and as the related rows that have been changed are chained together.

Match Keys and Relationships

It is important to understand how COMPARE determines which pair of rows to compare from each source table. Further, it is important to distinguish comparing the data row-by-row from traversing the relationships to propagate the related change and orphan indicators.

Match Key

To compare the rows in a pair of tables, Compare uses a "match key" to determine which row from one source table is to be compared with a row from the other source table. The match key is the set of columns in both tables used to determine which rows correspond. (Details about match key specification and compatible columns are discussed in the *Compare User Manual*, Compare Each Pair of Tables using the Match Key.) When the values in the match key columns are the same, the rows are compared.

When available, Compare uses a primary key from one of the source tables as the match key. You can also define a temporary match key that you can use with the current Compare Process or save in the Compare Definition. However, when a primary key is not defined for either source table, Compare prompts you to define a match key. Although similar to primary keys, match keys are used only by the Compare Definition for which they are defined. Also, match keys do not have to be based on a unique index.

In this sample session, a primary key is available and is used. You are not prompted to create a match key, but there are many references to match keys and you should be familiar with the term.

Relationships

The Compare Process uses relationships to traverse the related tables and propagate the related change indicators. Relationships are also required to identify orphan rows. Therefore, when comparing two sets of data from multiple tables, the relationships used to determine the related changes are important. Only one relationship may be selected between any two tables in a given direction (i.e., for a specific parent and child), regardless of the relationships used to extract the data. In this example (which would typically be the case), only one relationship is defined between the tables. Compare automatically uses these relationships. However, if multiple relationships are defined, Compare prompts you to select the relationship to use.

The relationship may be defined in the DB2 catalog as a standard primary key/foreign key pairing. Alternatively, the relationships may be defined in the Optim Directory which provides more flexible relationships. Either way, the match key columns do not have to be included in the relationship. This provides interesting results if one of the columns in the relationship has been modified in a pair of rows for which the match key values are the same. Although these rows are compared, the parent row related to each of these compared rows is not the same.

Additional information and examples are provided in Chapter 5, “Review the Results,” on page 17, which discusses browsing the results of the Compare Process.

Chapter 5. Review the Results

The Compare Process creates a Compare File to contain the results and, if requested, a report that can be stored in a sequential file.

You can request that Compare invoke a browse session automatically after the Compare Process is executed online. You can also browse the contents of an existing Compare File online using Option B BROWSE on the **COMPARE Process** menu.

For this sample session, the specifications shown in Chapter 4, “Execute the Compare Process,” on page 13establish that the process is executed online and a browse session is invoked when the process completes. During a browse session, you can display the results of the comparison online using an ISPF-like browse facility. The facility includes such functions as joining and synchronized scrolling to view the changes as they relate to the other compared data. The source of each row is clearly identified and all changes are highlighted.

Compare File Summary

To begin the browse session, the Compare Summary Selection List panel displays summary information and a selection list of the pairs of tables involved in the Compare Process.

```
----------------------- Compare Summary Selection List -------------------------
Command ===>                                                   Scroll ===> PAGE

Use 'S' to Select Browse Start Table, 'I' for Extended Table Information

Source 1: XF - FOPDEMO.EXTRACT, SUBSYS: TDB2
Source 2: DB2 Tables, SUBSYS: TDB2
                                                                  Rows    Non-
                                                      Changes     with   Unique
                             Total  UnMatched  Equal  (D)irect   Missing Match
Sel   Source:Table Name      Rows     Rows     Rows   (R)elated  Parents  Keys
--- -------------------->> -------- -------- -------- --------- -------- -------
*** ********************************** TOP ************************************
S__ 1 FOPDEMO.CUSTOMERS        703        1      690 D:      12      N/A       0
    2 FOPDEMO.CUSTOMERS        704        2          R:      25      N/A       0

___ 1 FOPDEMO.ORDERS          1712       10     1697 D:       5        0       0
    2 FOPDEMO.ORDERS          1709        7          R:       4        0       0

___ 1 FOPDEMO.SHIP_TO          503        9      490 D:       4        0       8
    2 FOPDEMO.SHIP_TO          526       32          R:     N/A        6      25

___ 1 FOPDEMO.DETAILS         3591       11     3574 D:       6        0       0
    2 FOPDEMO.DETAILS         3596       16          R:     N/A        0       0

___ 1 FOPDEMO.ITEMS            102        0      102 D:       0      N/A       0
    2 FOPDEMO.ITEMS            102        0          R:       0      N/A       0
*** ******************************** BOTTOM ***********************************
```

Figure 8. Compare Summary Selection List

The summary information provides an overview of the comparison results. Each source is identified. For this sample session, Source 1 is the before image contained in an Extract File and Source 2 is the after image in a set of DB2 tables, the test database. The source of both is the subsystem TDB2.

Statistics are included for the following:

Total Rows
The total number of rows from each table for each source.

UnMatched Rows
The number of rows from each table that contain a match key value that does not match a row in the table with which it was compared. This occurs when rows have been added to or deleted from one of the sources. In the figure, the Source 1 CUSTOMERS table has one unmatched row and the Source 2 CUSTOMERS table has two. (The application deleted one row and added two.)

Equal Rows
The number of rows in a pair of compared tables that are the same. That is, every column included in the comparison in the row from Source 1 exactly matches the corresponding columns in Source 2. The compared CUSTOMERS tables have 690 identical rows. (The application did not modify these rows.)

Changes
The number of rows in each table where the match key value matched a row in the other source, but a value in another compared column did not match. Changes are identified as:

(D)irect
Number of rows that are different between the two named tables.

(R)elated
Number of rows that are related to rows that were changed in dependent tables.

There are 12 direct changes and 25 related changes noted for the CUSTOMERS table. (The application modified 12 rows in the CUSTOMERS table and 25 rows in related tables.)

Rows with Missing Parents
The number of rows in each dependent table that do not have a parent row in a source table. This can occur when the parent row was deleted from one source, but the children were not.

There are six rows in the Source 2 SHIP_TO table that are orphans. These rows do not have a corresponding row in the parent table CUSTOMERS. (Either the application deleted CUSTOMERS rows without deleting the related SHIP_TO rows or the application inserted SHIP_TO rows without regard to parents in the CUSTOMERS table. This cannot occur if DB2 RI rules are in effect. However, the relationship for CUSTOMERS and SHIP_TO is defined in the Optim Directory.)

Non-Unique Match Keys
The number of rows that have duplicate match key values in each source table. (The application inserted rows with duplicate key values. Although DB2 requires that primary keys are based on unique indexes, the Optim Directory does not. Therefore, if a Optim primary key or an explicit match key is used for the Compare Process, non-unique match key values can be encountered.)

Compare bypasses these rows because it is impossible to determine which row from one source matches a row from the other.

There are 25 rows in the Source 2 SHIP_TO table that have non-unique match key values. These 25 rows have the same match key values in 8 rows in the Source 1 SHIP_TO table. In this sample session, only Source 2 has non-unique match keys but the corresponding rows in Source 1 are not compared and are also categorized as non-unique. (Therefore, the “8” indicates that there are eight sets of duplicate match key rows--Source 1 has one row for each set. Each set, as indicated by the 25 rows in Source 2, can contain more than two duplicate rows. This can not be determined without examining the data.)

Although the non-unique match key values occurred in only one source in this sample session, that may not always be the case.

Information about One Pair of Tables

To help in determining which pair of tables to select to begin the browse session, you can display information about a specific pair of tables using the Information line command, I.

Assume I has been entered for the pair of CUSTOMERS tables. The following is displayed.

```
---------------------- Compare Summary Selection List -----------------------
Command ===>                                                Scroll ===> PAGE

Use 'S' to Select Browse Start Table, 'I' for Extended Table Information

Source 1: XF - FOPDEMO.EXTRACT, SUBSYS: TDB2
Source 2: DB2 Tables, SUBSYS: TDB2

+-------------------- Extended Compare Table Information --------------------+
|                                                                            |
| ------------------------------------------------------------------------- |
| ********************************** TOP ********************************** |
|         Source 1 Table Name                  Source 2 Table Name           |
| ----------------------------------  ---------------------------------- |
| FOPDEMO.CUSTOMERS                    FOPDEMO.CUSTOMERS                     |
|                                                                            |
|      Source 1 Column Name           Source 2 Column Name      Status  Attr |
| ------------------------------ ------------------------------ ------- ---- |
| CUST_ID                        CUST_ID                        MATCH   SAME |
| CUSTNAME                       CUSTNAME                       COMPARE SAME |
| ADDRESS                        ADDRESS                        COMPARE SAME |
| CITY                           CITY                           COMPARE SAME |
| STATE                          STATE                          COMPARE SAME |
| ZIP                            ZIP                            COMPARE SAME |
| YTD_SALES                      YTD_SALES                      COMPARE SAME |
| SALESMAN_ID                    SALESMAN_ID                    COMPARE SAME |
| PHONE_NUMBER                   PHONE_NUMBER                   COMPARE SAME |
|                                                                       Rel  |
|       Related Tables                Type     Name    From   Status   Src  |
| ----------------------------------  ------  -------- ---- ---------- ---  |
| SHIP_TO                             CHILD   CSHIP    OPT  SELECTED    2   |
| ORDERS                              CHILD   RCO      DB2  SELECTED    2   |
| ******************************** BOTTOM ********************************* |
+----------------------------------------------------------------------------+
```

Figure 9. Extended Compare Table Information

Column Information

This panel displays the names of the source tables and, beneath each, lists the columns from the table. **Status** for each pair of columns indicates:

MATCH
The columns are included in the match key.

COMPARE
The columns are compared when the values in the paired match key columns are the same.

NOTUSED
The column is found in one table only or has been specifically excluded from the Compare Process. That means, the column is not involved in determining changed and unchanged rows.

Attr indicates whether the attributes of the compared columns are the SAME or DIFFerent. For this sample scenario, the columns are the same. However, columns with different attributes can be compared

provided they have compatible attributes. (For details about compatibility, see the *Common Elements Manual*, Compatibility Rules.)

Related Tables

Any related tables are listed after the column information. The information for these tables includes the following:

Type Indicates whether the named related table is the PARENT or CHILD in the relationship. In the sample Extended Compare Table Information panel, both tables are children of CUSTOMERS.

Name The name of the relationship.

From The source of the relationship as either DB2 (DB2 Catalog) or OPT (Optim Directory). In the sample Extended Compare Table Information panel, the first relationship is from the Optim Directory and the second from the DB2 Catalog.

Status Indicates whether the relationship is selected or unselected. In the sample Extended Compare Table Information panel, both relationships are SELECTED. If a relationship is unselected, it is not used to propagate the related change flags.

Rel Src
The source of the relationship as either Source 1 or Source 2.

According to the information displayed about related tables, the CUSTOMERS table is directly related to both ORDERS and SHIP_TO.

Browse the Comparison Results

To display the comparison results, select any pair of tables as the starting point for the browse session by typing an S prior to that pair of tables.

In Figure 8 on page 17, the pair of CUSTOMERS tables is selected. (For this sample session, the CUSTOMERS table is a logical starting point, based on the structure of the distributed sample database.)

The data display for the browse session begins with the following panel.

```
-------------------- Optim: Browse (Source 1 Names Shown) ---------------------
Command ===>                                                 Scroll ===> PAGE

Cmd Chg Src == Table: CUSTOMERS(T1) ======================== 1 OF 717 === MORE>>
            CUST_ID       CUSTNAME             ADDRESS             CITY
            ------- -------------------- ==================== ---------------
*** ************************************ TOP ********************************
___  DR  1   00001  Audio-Video World    593 West 37th Street Brass Castle
___  DR   2  00001  Audio Video World    593 West 37th Street Black Castle
___      12  00002  Select-A-Vision      5720 MacArthur Drive Evening Shade
___   R  12  00003  Showplace            1 Ocean Parkway      Alto
___  DR  1   00004  Audio-Video World    593 West 37th Street West Palm Beach
___  DR   2  00004  Audio-Video World    593 West 37th Street Panacea
___      12  00005  Take Home Movies     Box 357              Fence Lake
___      12  00006  Main Street Video    Gateway Shopping Cen Pumpkin Center
___   R  12  00007  Cinemagic            Pass-a-Grille Beach  Pass-a-Grille
___       2  00008  Director's Chair     347 Miners Row       Spuds
___   R  12  00009  Prime Time Video     64 Newberg Avenue    Loving
___   R  12  00010  Reely Great Videos   590 Frontage Rd      Christmas Valley
___      12  00011  Director's Chair     347 Miners Row       Kiester
___       2  00012  Main Street Video    Gateway Shopping Cen Howey in Hills
___      12  00013  Front Row Video      U.S. Highway 130     Christmas
___      12  00014  Reely Great Videos   590 Frontage Rd      Economy
___      12  00015  Director's Chair     347 Miners Row       Happy Camp
___      12  00016  Movies-R-Us          1772 Bridge St       Bonanza
___
```

Figure 10. Compare Results Display

The compared data from both sources is displayed. The changes encountered in the data are highlighted by the Compare Process.

Match Key

The data is sorted by match key columns in ascending order. The match key columns are listed first. On the display, the column heading is highlighted to identify the match key column. In this example, CUST_ID is the match key column.

Additional Information

In addition to the data, the display includes a line that provides the information headings (**Cmd**, **Chg**, and **Src**), the table name, the number of rows and the relative position of the first displayed row, and a horizontal scroll indicator.

Displayed Names

In this sample session, the table names and column names from each source are the same, but that may not always be the case. By default, the Source 1 table name is the displayed name. The Creator ID, the portion of the name most likely to differ, is not displayed. Similarly, the Source 1 column headings are displayed by default. If you prefer, you can display the Source 2 table names and column headings. Use the FLIP command to toggle the names.

Compare assigns an identifier to the table name. This identifier provides shorthand notation for specifying the table as an operand on the many available primary commands. In the figure, T1 meaning Table 1, is assigned.

Src

The rows from both sources are displayed. The source is identified in **Src**. You can readily identify which rows have changed by the value in **Src**.

Equal Rows

When the row has not changed between the sources (that is, the row in Source 1 exactly matches the row in Source 2), the row is displayed once and **Src** contains "12" indicating Source 1 and Source 2. (The customers with CUST_ID 00002 and 00003 are the same in both sources.)

You can take advantage of a user option to remove the equal rows identifier from the display to help focus on the differences.

Changed Rows

When the row has changed, the row from each source is displayed on consecutive lines and **Src** contains either "1" or "2" to indicate which source. (The rows for the customers with CUST_ID 00001 and 00004 have changed.) These rows are marked as having a Direct change as described later. The data in the compared columns that differ is highlighted.

One Source Only

When the row exists in only one source (it was added or deleted by the application), **Src** contains "1" or "2" appropriately. (The customers with CUST_ID 00008 and 00012 exist only in Source 2.) The **Src** value for these rows is highlighted.

Chg

In addition to identifying the source of each row, the type of change is indicated in **Chg** , when appropriate. In Figure 10 on page 21, the following types of changes are identified:

D The compared rows contain direct changes.

R The rows are related to rows in subordinate tables that have changed or are unmatched.

DR The compared rows contain direct changes and related changes.

The Compare Process also identifies the rows that do not have a parent table or that have different parent tables. These rows are marked with a **U** for Unusual row. The CUSTOMERS table is the parent table, so this is not applicable for this example.

The rows that have duplicate match keys are all displayed and identified by brackets. The CUSTOMERS table does not have any rows with duplicate match keys.

Display Related Changes

Initially, the data from only one pair of tables is displayed. To get a more complete view of what has changed, you need to display the related rows from other tables.

You can easily identify which rows have related changes by the R in **Chg**. However, the R can be generated by direct changes or unmatched rows in more than one dependent table. You can obtain information about which related tables contain the changes using the I line command. For example, assume the I command is entered on the line containing the first pair of compared rows in the CUSTOMERS table, CUST_ID 00001. The following information is displayed.

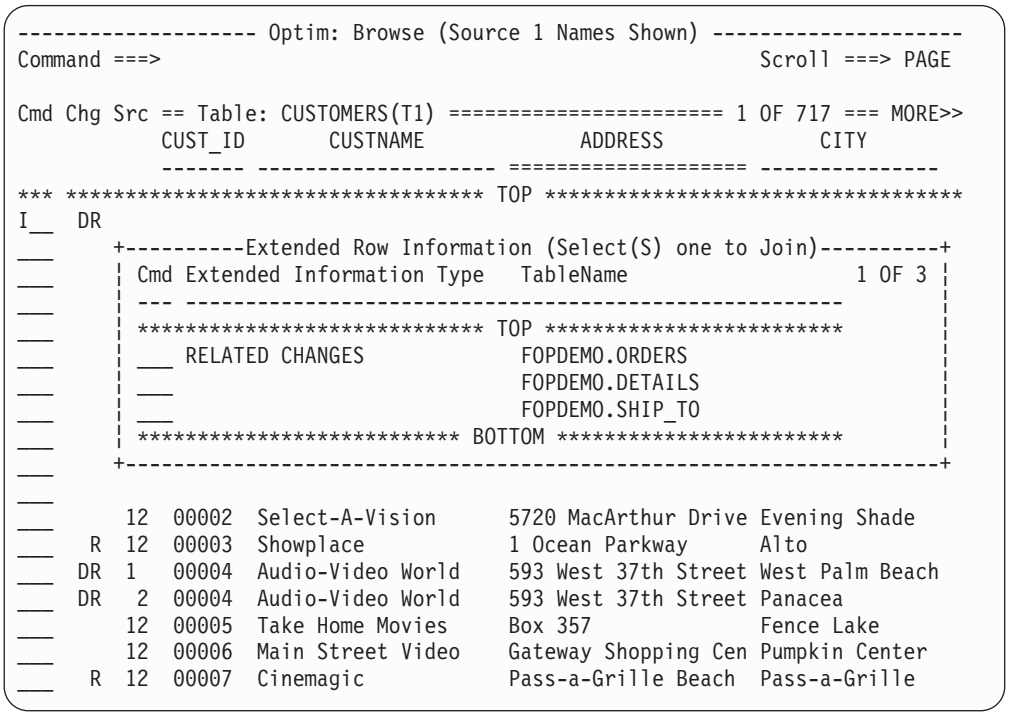


Figure 11. Extended Row Information

The **Extended Row Information** pop-up lists each related change, showing each type of change that applies in the **Extended Information Type** column, with the names of associated tables in the **TableName** column.

Note: The **Cmd** area is displayed only if related changes are noted on the row identified by the I line command. The **Cmd** area allows you to select and join to a table to display the related changes. For details about the Auto Join feature, see the *Compare User Manual*, Joining Related Data.

Extended Information Types

The information includes the **Extended Information Type** as one of the following:

RELATED CHANGES
The compared tables listed in the **TableName** column contain changed rows related to the row identified by the I line command. (RELATED CHANGES are identified in the figure.)

ORPHAN-MISSING PARENT ROW
The row identified by the I line command does not have a related parent row in the table listed in the **TableName** column.

DIFFERENT PARENT ROWS
The compared rows identified by the I line command are related to different rows in the parent table listed in the **TableName** column. That is, values in the columns in the relationship have been modified.

DIFFERENT CHILD ROWS
The compared rows identified by the I line command are related to different rows in the child table listed in the **TableName** column. That is, the columns from the parent that participate in the relationship have been changed. This can only occur when a relationship in the Optim Directory is used and the relationship does not include the match key columns.

Use END to return to the Browse display.

Join Facility

Use the Join facility to display the related data. This facility displays the related data from other tables based on the relationships defined between the tables.

Use the J line command or the JOIN primary command to “join” a related table and display the related data.

In this sample session, the CUSTOMERS table is directly related to the ORDERS and SHIP_TO tables. The Extended Row Information panel notes that there are **Related Changes** in three tables--ORDERS, SHIP_TO, and DETAILS. (Note that DETAILS is not directly related to CUSTOMERS, but is related to ORDERS. Even if there had been no changes to the ORDERS row, the change to the DETAILS table would have propagated the related change flag to the CUSTOMERS table. The related change flag is propagated to every related parent row in the entire chain.)

Assume the line command J is typed on the first displayed CUSTOMERS row. If CUSTOMERS were related to only one table participating in the Compare Process, the related data is joined and displayed automatically. Since CUSTOMERS is related to two tables, you are prompted to select one or more tables.

```
-------------------- Optim: Browse (Source 1 Names Shown) ---------------------
Command ===>                                                Scroll ===> PAGE

Cmd Chg Src == Table: CUSTOMERS(T1) ======================= 1 OF 717 === MORE>>
            CUST_ID       CUSTNAME             ADDRESS              CITY
            ------- -------------------- ==================== ---------------
*** ********************************** TOP ************************************
J__  DR  1   00                                                    tle
___  DR   2  00 +-------- Select One or More Related Tables----------+ tle
___       12  00 | Cmd Table Name (Source 1 Name)  From  Type  1 OF 2 | hade
___    R  12  00 | --- ---------------------------------------        |
___  DR  1   00 | ****************** TOP ******************          |  Beach
___  DR   2  00 | S__ FOPDEMO.ORDERS              OPT  CHILD         |
___       12  00 | ___ FOPDEMO.SHIP_TO             OPT  CHILD         | e
___       12  00 | ***************** BOTTOM ******************        | enter
___    R  12  00 +-------------------------------------------------+ ille
___        2  00
___    R  12  00009  Prime Time Video     64 Newberg Avenue    Loving
___    R  12  00010  Reely Great Videos   590 Frontage Rd      Christmas Valley
___       12  00011  Director's Chair     347 Miners Row       Kiester
___        2  00012  Main Street Video    Gateway Shopping Cen Howey in Hills
```

Figure 12. Select One or More Related Tables

Use the S line command to select the table to join.

Three Tables

For this sample session, the ORDERS table is selected for the join.

In addition, join the DETAILS related to the third ORDERS row. Type J on the third displayed ORDERS row, and select DETAILS from the selection list. The related data from these three tables is shown in the following example.

```
-------------------- Optim: Browse (Source 1 Names Shown) ---------------------
Command ===>                                                 Scroll ===> PAGE

Cmd Chg Src == Table: CUSTOMERS(T1) ====================== 1+ OF 717 === MORE>>
            CUST_ID       CUSTNAME             ADDRESS             CITY
            ------- -------------------- ------------------- ---------------
___  DR  1   00001  Audio-Video World    593 West 37th Street Brass Castle
___  DR   2  00001  Audio Video World    593 West 37th Street Black Castle

Cmd Chg Src == Table: ORDERS(T2) ========================== 3+ OF 6 === MORE>>
            ORDER_ID CUST_ID ORDER_DATE ORDER_TIME FREIGHT_CHARGES
            -------- ------- ---------- ---------- ---------------
___  DR  1      275   00001  1999-02-02  11.51.47       21.97
___  DR   2     275   00001  1999-02-02  11.51.47       32.97

Cmd Chg Src == Table: DETAILS(T3) ========================== 1 OF 4 ==========
            ITEM_ID ORDER_ID ITEM_QUANTITY DETAIL_UNIT_PRICE
            ------- -------- ------------- ----------------
*** ********************************** TOP ***********************************
___  D   1   DR012      275          5            19.00
___  D    2  DR012      275          3            19.00
___       12  DR029      275         12            22.00
___       12  DR038      275          6            20.00
*** ******************************** BOTTOM *********************************
```

Figure 13. Three Joined Tables

An information line is provided to display headings for the joined tables. As with the first table, the table name is taken from Source 1 and an identifier is assigned by Compare. Here, T2 (Table 2) is assigned to the ORDERS table and T3 (Table 3) is assigned to the DETAILS table.

The source and nature of the changes are highlighted. A highlighted D in **Chg** notes the rows with direct changes in the three tables. The changes are also highlighted.

An R in **Chg** indicates the changes to the ORDERS rows related to the CUSTOMERS row CUST_ID 00001. Similarly, an R in **Chg** indicates the changes to the DETAILS rows, a dependent table related to ORDERS, for ORDER_ID 275 in the ORDERS table. (Even if there are no changes to the ORDERS table, the related change flag is propagated from DETAILS to ORDERS and then from ORDERS to CUSTOMERS.)

You can scroll any table. All related data is automatically scrolled. For example, assume the CUSTOMERS table is scrolled to the CUSTOMERS row with CUST_ID 00003. (Position the cursor on the CUSTOMERS table and press PF8 (DOWN) twice.)

The following is displayed.

```
-------------------- Optim: Browse (Source 1 Names Shown) ---------------------
Command ===>                                                 Scroll ===> PAGE

Cmd Chg Src == Table: CUSTOMERS(T1) ====================== 4  OF 717 === MORE>>
            CUST_ID       CUSTNAME             ADDRESS             CITY
            ------- -------------------- ==================== ---------------
___  R   12  00003  Showplace            1 Ocean Parkway      Alto

Cmd Chg Src == Table: ORDERS(T2) ========================== 1+ OF 4 === MORE>>
            ORDER_ID CUST_ID ORDER_DATE ORDER_TIME FREIGHT_CHARGES
            -------- ------- ---------- ---------- ---------------
___ DRU  1       25   00003  1999-12-02  08.16.09       14.80
___ DRU   2      25   00004  1999-12-02  08.16.09       14.80

Cmd Chg Src == Table: DETAILS(T3) ========================== 1 OF 7 === MORE>>
            ITEM_ID ORDER_ID ITEM_QUANTITY DETAIL_UNIT_PRICE
            ------- -------- ------------- ----------------
*** ********************************** TOP ************************************
___ D    1   CM015       25          4            19.00
___ D     2  CM015       25          5            19.00
___ D    1   DR041       25          4            20.00
___ D     2  DR041       25          5            20.00
___ D    1   MU005       25          8            25.00
___ D     2  MU005       25         10            25.00
___       12 SF017       25          5            32.00
*** ********************************* BOTTOM **********************************
```

Figure 14. Unusual Rows Displayed

There are related changes in both the CUSTOMERS and ORDERS table, and direct changes in both the ORDERS and the DETAILS tables. The compared rows from the ORDERS table are flagged with DRU in **Chg**.

D The direct changes are located in the CUST_ID column.

R The related changes in the DETAILS table are identified.

U The direct change in the CUST_ID column in the ORDERS table results in an unusual situation. These rows were compared because the match key value (ORDER_ID column) is the same. However, the CUST_ID column is used for the relationship to the CUSTOMERS table, and since the value is not the same, different CUSTOMERS rows (or parents) are related. That is, the row from Source 1 is related to CUST_ID 00003 and the row from Source 2 is related to CUST_ID 00004. These compared ORDERS rows are displayed for the CUSTOMERS row with CUST_ID 00004 as well as CUST_ID 00003.

You can use the I line command for a row that contains the U status flag to determine what may have generated the flag. Assume I is specified on the ORDERS row with the U status listed in the previous figure. The following Extended Row Information panel is displayed.

```
-------------------- Optim: Browse (Source 1 Names Shown) ---------------------
Command ===>                                                 Scroll ===> PAGE

Cmd Chg Src == Table: CUSTOMERS(T1) ====================== 4  OF 717 === MORE>>
            CUST_ID       CUSTNAME             ADDRESS             CITY
            ------- -------------------- ==================== ---------------
___   R   12  00003  Showplace            1 Ocean Parkway      Alto

Cmd Chg +--------------------Extended Row Information--------------------+ RE>>
        | Extended Information Type   TableName                  1 OF 2 |
        | ------------------------------------------------------        |
I__ DR  | ************************ TOP ************************         |
___ DR  | RELATED CHANGES             DETAILS                            |
        | DIFFERENT PARENT ROWS       CUSTOMERS                          |
Cmd Chg | ********************** BOTTOM ********************************| RE>>
        +-----------------------------------------------------------------+

*** ********************************** TOP ***********************************
___ D    1   CM015       25          4            19.00
___ D     2  CM015       25          5            19.00
___ D    1   DR041       25          4            20.00
___ D     2  DR041       25          5            20.00
___ D    1   MU005       25          8            25.00
___ D     2  MU005       25         10            25.00
___       12  SF017      25          5            32.00
*** ********************************* BOTTOM *********************************
```

Figure 15. Extended Row Information for Unusual Rows

In addition to noting the related change in the DETAILS table, the information states that there are different parent rows for each source in the CUSTOMERS table. (See “Extended Information Types” on page 23 for a description of possible values.)

Use END to return to the Browse display.

Focus on Changes

You can continue to scroll through all the changed and unchanged rows, or you can focus on only the changed data. For example, assume you want to look at only the data for customers that have changed.

Using the Join facility in combination with some simple commands, you can exclude all common rows from the CUSTOMERS table and then scroll the related data for the changed customers only.

Zoom

To focus on the CUSTOMERS table, you can “zoom” to display all rows from that table while maintaining the joins to the related tables. You can use the ZOOM primary command or the Zoom line command. Assume the line command is entered in **Cmd** for the CUSTOMERS row with CUST_ID 00001. (Since this is the first CUSTOMERS row, you may have to scroll up to display this row.) When zoom is requested, all rows in the CUSTOMERS table are displayed as shown in the initial Browse display (see Figure 10 on page 21).

Exclude Rows

To exclude all common rows use the EXCLUDE command:

```
EXCLUDE COMMON ALL
or
X COM ALL
```

```
-------------------- Optim: Browse (Source 1 Names Shown) ---------------------
Command ===>                                                 Scroll ===> PAGE

Cmd Chg Src == Table: CUSTOMERS(T1) ================ ZOOMED = 1 OF 74 === MORE>>
            CUST_ID       CUSTNAME             ADDRESS             CITY
            ------- -------------------- ================== --------------
*** ********************************** TOP ************************************
___ DR   1   00001  Audio-Video World    593 West 37th Street Brass Castle
___ DR    2  00001  Audio Video World    593 West 37th Street Black Castle
___   ------------------------------------------------------ 1 LINE(S) EXCLUDED
___  R   12  00003  Showplace            1 Ocean Parkway      Alto
___ DR   1   00004  Audio-Video World    593 West 37th Street West Palm Beach
___ DR    2  00004  Audio-Video World    593 West 37th Street Panacea
___   ------------------------------------------------------ 2 LINE(S) EXCLUDED
___  R   12  00007  Cinemagic            Pass-a-Grille Beach  Pass-a-Grille
___       2  00008  Director's Chair     347 Miners Row       Spuds
___  R   12  00009  Prime Time Video     64 Newberg Avenue    Loving
___  R   12  00010  Reely Great Videos   590 Frontage Rd      Christmas Valley
___   ------------------------------------------------------ 1 LINE(S) EXCLUDED
___       2  00012  Main Street Video    Gateway Shopping Cen Howey in Hills
___   ------------------------------------------------------ 4 LINE(S) EXCLUDED
___ D    1   00017  Movie Maniac         572 Front St         Devils Garden
___ D     2  00017  Movie Mania          572 Front St         Devils Garden
___  R   12  00019  It's In The Can      2005 Rt 22           Three Brothers
___   ------------------------------------------------------ 4 LINE(S) EXCLUDED
___  R   12  00024  Rick's Flicks        823 Chestnut St      Fruitland
___   ------------------------------------------------------ 3 LINE(S) EXCLUDED
```

Figure 16. Exclude Common Rows

This excludes all rows in the CUSTOMERS table for which the rows and all related data are the same. For example, the row for the customer with CUST_ID 00002 is excluded because there are no changes, direct or related. In contrast, the customer with CUST_ID 00003 does not have a direct change, but there is a related change, and CUST_ID 00008 is found only in Source 2. These rows are not excluded.

Use the following operands with the EXCLUDE command to specify the rows to exclude.

S1 Source 1 rows exclusively. This includes rows with direct changes and unmatched rows.

S2 Source 2 rows exclusively. This includes rows with direct changes and unmatched rows.

S1* Source 1 and common rows.

S2* Source 2 and common rows.

S12 Common rows regardless of other flags.

S1U Unmatched Source 1 rows only.

S2U Unmatched Source 2 rows only.

UNMatched
Unmatched rows from Source 1 and Source 2.

Dir Rows with Direct changes only.

Rel Rows with Related changes only.

DR Rows with Direct or Related changes.

CHG Any change or any uncommon row.

COMmon
Common rows that have no other flags set.

DUP Rows with Duplicate match key values.

ORPhans
Orphan rows only.

RKD Rows that have a change in the columns that comprise the basis for a relationship to other tables.

UNUsual
Orphan rows, or rows that have a change in the columns that comprise the basis for a relationship to other tables.

In addition to these diverse operands, you can specify a value as the search string on the EXCLUDE command to further limit the displayed set of rows.

Use the SHOW command to redisplay the excluded rows. The SHOW primary command redisplays all excluded rows. The Show (S), First (F), and Last (L) line commands are available to redisplay selected rows.

Include Rows

At times you may want to "include," rather than exclude, specific rows. Use the ONLY command. All the operands available with EXCLUDE are available for ONLY. For example, you can specify ONLY CHG to obtain the same display as EXCLUDE COMMON ALL.

However, ONLY is most useful when you need to display specific data. For example, it is most expedient when you need to view only direct changes. The following displays the results when ONLY DIR is entered.

```
-------------------- Optim: Browse (Source 1 Names Shown) ---------------------
Command ===>                                                 Scroll ===> PAGE

Cmd Chg Src == Table: CUSTOMERS(T1) ================ ZOOMED = 1 OF 36 === MORE>>
            CUST_ID       CUSTNAME             ADDRESS             CITY
            ------- -------------------- ==================== ---------------
*** ********************************** TOP ***********************************
___ DR   1   00001  Audio-Video World    593 West 37th Street Brass Castle
___ DR    2  00001  Audio Video World    593 West 37th Street Black Castle
___   ------------------------------------------------------ 2 LINE(S) EXCLUDED
___ DR   1   00004  Audio-Video World    593 West 37th Street West Palm Beach
___ DR    2  00004  Audio-Video World    593 West 37th Street Panacea
___   ------------------------------------------------------ 14 LINE(S) EXCLUDED
___ D    1   00017  Movie Maniac         572 Front St         Devils Garden
___ D     2  00017  Movie Mania          572 Front St         Devils Garden
___   ------------------------------------------------------ 9 LINE(S) EXCLUDED
___ DR   1   00028  Replay Videos        57 Bridge Street     Mars
___ DR    2  00028  Replay Videos        57 Bridge Street     Martin
```

Figure 17. Only Direct Changes

Unlike EXCLUDE COMMON ALL or ONLY CHG, the rows found in only one source are not included in this display.

You can achieve the same results as ONLY DIR using EXCLUDE and FIND. For example, you can enter:

EXCLUDE COMMON ALL
FIND ALL DIR

FIND Command

However, the FIND command is frequently used to locate one specific row or type of change rather than all of them. All the operands available for EXCLUDE are available for FIND.

With the flexibility and variety provided by these commands, you can decide which command or commands suit your needs best.

Unzooming

Use the ZOOM command again to redisplay all the related data. If the cursor is positioned on a line, that row is the first row displayed for the table when you return to the multiple table display. All related data is scrolled appropriately.

Alternatively, you can use the Zoom line command to return to the multiple table display. Enter Z in **Cmd** of the first displayed CUSTOMERS row to redisplay the related ORDERS and DETAILS rows.

Display Data from Other Tables

You can join to the other tables included in the comparison.

The SHIP_TO table was also listed on the Extended Row Information display. You can join directly to it from the CUSTOMERS table without "unjoining" the branch to the ORDERS and DETAILS tables. However, for this sample session unjoin from the ORDERS table. Use the UNJOIN primary command or the UNJ line command to remove one or more subordinate tables from the display.

Assume the UNJ line command is entered in **Cmd** for the CUSTOMERS table. Both ORDERS and DETAILS are removed from the display.

Enter the J line command on the first displayed CUSTOMERS row. The prompt to select a table, since both ORDERS and SHIP_TO are related to CUSTOMERS, is redisplayed. This time, select SHIP_TO, and the following is displayed.

```
-------------------- Optim: Browse (Source 1 Names Shown) ---------------------
Command ===>                                                 Scroll ===> PAGE

Cmd Chg Src == Table: CUSTOMERS(T1) ====================== 1+ OF 503 === MORE>>
            CUST_ID       CUSTNAME             ADDRESS             CITY
            ------- -------------------- ==================== ---------------
*** ********************************** TOP ************************************
___ DR   1   00001  Audio-Video World    593 West 37th Street Brass Castle
___ DR    2  00001  Audio Video World    593 West 37th Street Black Castle
Cmd Chg Src == Table: SHIP_TO(T2) ========================== 1 OF 5 === MORE>>
            SHIP_ID CUST_ID       ADDRESS              CITY       STATE
            ------- ------- ==================== --------------- -----
*** ********************************** TOP ************************************
___ /    1     803   00001  1000 Cactus Highway  Sweet Water      NJ
___ |     2    803   00001  1000 Cactus Highway  Sweet Water      NJ
___ |     2    803   00001  9023 Main Street     Flemington       NJ
___ |     2    803   00001  76 Washington Ave    Clinton          NJ
___ \     2    803   00001  1000 Cactus Highway  Sweet Water      NJ
*** ******************************** BOTTOM ***********************************
```

Figure 18. Duplicate Rows in SHIP_TO Displayed

The SHIP_TO table generated the related change indicator because it contains unmatched rows. In addition, these unmatched rows are duplicate rows. That is, the match key column, SHIP_ID, contains the same value for all displayed rows. Compare was unable to determine the row from Source 2 to compare with Source 1. Even though the row from Source 1 and the rows from Source 2 appear to be same, they have not been compared to determine if they are identical, and are displayed as separate rows.

Browse Complete

When you have completed browsing the results of the Compare Process, use END to terminate the session. The Compare Summary Selection List panel is redisplayed.

```
---------------------- Compare Summary Selection List ------------------------
Command ===>                                                  Scroll ===> PAGE

Use 'S' to Select Browse Start Table, 'I' for Extended Table Information

Source 1: XF - FOPDEMO.EXTRACT, SUBSYS: TDB2
Source 2: DB2 Tables, SUBSYS: TDB2
                                                                  Rows    Non-
                                                      Changes     with   Unique
                             Total  UnMatched  Equal  (D)irect   Missing Match
Sel   Source:Table Name      Rows     Rows     Rows   (R)elated  Parents  Keys
--- -------------------->> -------- -------- -------- --------- -------- -------
*** ********************************** TOP ************************************
___ 1 FOPDEMO.CUSTOMERS        703        1      690 D:      12      N/A       0
    2 FOPDEMO.CUSTOMERS        704        2          R:      25      N/A       0

___ 1 FOPDEMO.ORDERS          1712       10     1697 D:       5        0       0
    2 FOPDEMO.ORDERS          1709        7          R:       4        0       0

S__ 1 FOPDEMO.SHIP_TO          503        9      490 D:       4        0       8
    2 FOPDEMO.SHIP_TO          526       32          R:     N/A        6      25

___ 1 FOPDEMO.DETAILS         3591       11     3574 D:       6        0       0
    2 FOPDEMO.DETAILS         3596       16          R:     N/A        0       0

___ 1 FOPDEMO.ITEMS            102        0      102 D:       0      N/A       0
    2 FOPDEMO.ITEMS            102        0          R:       0      N/A       0
*** ******************************** BOTTOM ***********************************
```

Figure 19. Compare Summary Selection List

Displaying Orphans

It is preferable to view orphans by browsing the child tables. For example, assume a parent row is deleted from Source 1, but not Source 2. If there are related children in Source 1 that are not deleted, they will be identified by joining from the Source 2 parent row. However, this is an unreliable way to identify orphans. To display all orphans in any table, you need to display all compared rows in the pair of child tables.

On the Compare Summary Selection List panel, **Rows with Missing Parents** indicates that there are six orphans in the Source 2 SHIP_TO table. To display these orphans, select the SHIP_TO table to browse the data. When the data is displayed, use the ONLY command to limit the display to orphans.

ONLY ORPHANS

The following panel is displayed.

```
-------------------- Optim: Browse (Source 1 Names Shown) ---------------------
Command ===>                                                 Scroll ===> PAGE

Cmd Chg Src == Table: SHIP_TO(T1) ========================== 1 OF 11 === MORE>>
            SHIP_ID CUST_ID       ADDRESS             CITY       STATE
            ------- ------- ------------------- -------------- -----
*** ********************************* TOP ***********************************
___   ------------------------------------------------------ 4 LINE(S) EXCLUDED
___ /  U  2      3   05209  1000 Cactus Highway  Sweet Water      AR
___ |  U  2      3   07209  1000 Cactus Highway  Sweet Water      AR
___   ------------------------------------------------------ 5 LINE(S) EXCLUDED
___    U  2      6   05209  9002 Green Street    Misty Morning    AR
___   ------------------------------------------------------ 3 LINE(S) EXCLUDED
___    U  2      8   05209  300 Stagecoach Rd    Cowpoke          AR
___   ------------------------------------------------------ 106 LINE(S) EXCLUDED
___    U  2    403   02257  1000 Cactus Highway  Sweet Water      FL
___   ------------------------------------------------------ 415 LINE(S) EXCLUDED
```

Figure 20. Only Orphans in SHIP_TO Displayed

The orphans in the SHIP_TO table are displayed. They were all encountered in Source 2 (**Src** value is 2).

The second and third orphan rows are also duplicate rows. They have the same match key value. (SHIP_ID is the match key for SHIP_TO.)

You can continue to browse the contents of the Compare File, joining, scrolling, and manipulating the display. The Compare File is retained, so you can terminate the current session and return later to browse the same compared data or generate a report.

Chapter 6. Compare Report

You can generate a report from the comparison results and store that report in a sequential file. Then, this report can be displayed or printed using standard ISPF facilities.

You can request a report as part of the Compare Process by specifying Yes to **Generate Reports** on the Specify COMPARE Parameters and Execute panel. You can also request a report by selecting Option R REPORT on the **COMPARE Process** menu. The following panel is displayed.

```
---------------------- Specify COMPARE Report Parameters -----------------------
Command ===>                                                 SCROLL ===> PAGE

Compare File DSN ===> COMPARE
Report File DSN  ===> 'FOPDEMO.ABC'

  Report Type    ===> D               (S-Summary, D-Details)
  Lines Per Page ===>                 (0-No Titles, 1-99, Blank=57)
  Specify Table Name to Limit Report (Blank for ALL Tables in Compare)
    Table Name   ===>

  If Detail Report Specify Format and Select Desired Row Types:
    Report Format          ===> C     (C-Columnar, S-Sidelabels, E-External)
      If S, Which Columns? ===> A     (A-All, D-Different and Key Columns Only)
    All Rows               ===> Y     (Y-Yes, N-No)
    Or, if NO, Select One or More of the following Row Types:
      Direct Changes       ===> Y     (Y-Yes, N-No)
      Related Changes      ===> Y     (Y-Yes, N-No)
      Unmatched Rows       ===> Y     (Y-Yes, N-No)
      Orphan Rows          ===> Y     (Y-Yes, N-No)
      Duplicate Match Keys ===> Y     (Y-Yes, N-No)
    Wide Lines             ===> C     (C-Change File, W-Wrap Data)
  Display Unused Columns      : Y     (Y-Yes, N-No)
```

Figure 21. Specify COMPARE Report Parameters

When the report is generated as part of the Compare Process, the name of the Compare File is supplied and cannot be modified. From the **COMPARE Process** menu Option R, you must specify the name of a Compare File. (The Compare File created in this scenario is displayed.) Specify a sequential file to receive the output.

The remaining prompts determine the contents of the report.

Report Type
: Indicate whether the report is to include only the summary information, or both the detail and summary information. Summary information includes the names of the tables from each source, the total number of rows for every type of detail that can be reported on and the total number of rows in the comparison from each table. Detail information includes the rows of data from the compared tables, identification of changed rows, and the source of each row.

Lines Per Page
: Specify the maximum number of lines per page. Specify 0 to suppress titles, or specify a value from 1 through 99 for the number of lines per page. Leave blank to use the default, 57 lines per page.

Table Name
: Specify the name of a table to limit the report to a single table when multiple tables have been compared.

Details

If you specify Details for **Report Type**, you can specify the report format and select which rows to include based on the row status. You can specify whether the details of the report are printed in columnar or sidelabels format. In sidelabels format, you can limit the report to include only different and match key columns.

For either format, you can select which details to include based on their status. The status is printed along with each row. The available statuses are listed on the panel.

Select Rows by Status

You can select all rows (specify Y for **All Rows**) or one or more of the following:

Direct Changes
All rows from Source 1 and Source 2 that have the same match key value but different values in one or more other columns.

Related Changes
All rows that have dependent rows with direct changes or unmatched rows.

Unmatched Rows
All rows from Source 1 and Source 2 that do not have a match key value that matches a row from the other source.

Orphan Rows
All rows from Source 1 and Source 2 that do not have a parent. These rows are found only when a related parent table is included in the Compare Process.

Duplicate Match Keys
All rows from Source 1 and Source 2 that have duplicate match key values. Since the match key values are the same in multiple rows, Compare does not attempt to match the rows arbitrarily. Instead, the rows are unmatched and marked with a special flag.

The report specifications have no impact on the Compare Process and the contents of the Compare File. They only define the data that is written to the report.

The Compare File created in this manual is used as the input to provide a sample report. Assume only changes, direct and related, are included in the report. Also, the report is in columnar format. (For examples of sidelabels and external formats, see the *Compare User Manual*.)

Report Format

In the report, each table is listed separately. The statistics for each table are followed by the details. In the following segment, the information for the CUSTOMERS tables is displayed.

```
                    Optim - COMPARE File Report

Compare File     : FOPDEMO.SAMPLE.COMPARE
Created by       : Job NADELSS using SQLID OPTIM on 08 Sep 1998 at 02:38 PM
Number of Tables : 5

Source 1         : Extract File - Z13600MP.FOPDEMO.EXTRACT
  Created by     : Job NADELSS using SQLID OPTIM
  Created on     : 08 Sep 1998 at 09:40 AM on DB2 Subsystem TDB2

Source 2         : All Rows from DB2 Tables
  Created by     : Job NADELSS using SQLID OPTIM
  Created on     : 08 Sep 1998 at 02:38 AM on DB2 Subsystem TDB2

Table Statistics: 1:FOPDEMO.CUSTOMERS  2:FOPDEMO.CUSTOMERS
   Total Number of Merged Rows                 :    705
   Total Number of Rows from Source 1          :    703
   Total Number of Rows from Source 2          :    704
   Number of Unmatched Rows from Source 1      :      1
   Number of Unmatched Rows from Source 2      :      2
   Total Number of Equal Rows                  :    690
   Total Number of Rows with Direct Changes    :     12
   Total Number of Rows with Related Changes   :     11
   Total Number of Orphan Rows on Source 1     :    N/A
   Total Number of Orphan Rows on Source 2     :    N/A
   Sets of Rows with Non-Unique Keys           :      0
   Total Number of S1 Rows with Non-Unique Keys:      0
   Total Number of S2 Rows with Non-Unique Keys:      0

Chg  Src CUST_ID CUSTNAME              ADDRESS
---- --- +++++++ -------------------- ------------------------------------
 DR  1   00001   Audio-Video World     593 West 37th Street
 DR   2  00001   Audio-Video World     593 West 37th Street
     12  00002   Select-A-Vision      5270 MacArthur Drive
  R  12  00003   Showplace            1 Ocean Parkway
 DR  1   00004   Audio-Video World     593 West 37th Street
 DR   2  00004   Audio-Video World     593 West 37th Street
     12  00005   Take Home Movies     Box 357
     12  00006   Main Street Video    Gateway Shopping Center
```

Figure 22. Sample Compare File Report

The header information for the report includes the name of the Compare File, the user that generated the report and the time, and the number of tables in the process. The sources are listed along with any pertinent information about each source. The comprehensive summary information parallels the information presented on the COMPARE Summary Selection List panel.

This is followed by the requested report information for each table. In this example, the information is provided for the CUSTOMERS table, the first table listed in the Compare Process.

The detail information includes the **Chg** and **Src** information, followed by the other data. The match key columns are presented first and plus signs (+) are used to separate the data from the column name, rather than underscores.

Direct

Both the Source 1 and Source 2 versions of changed rows are included. The source is identified in **Src** and the presence of a change indicated by D in **Chg**. The actual changes are indicated by an arrow (>) preceding the data.

Related

Unchanged rows (that is, rows in which all compared column values match) are included once. For example, the CUSTOMERS row for CUST_ID 00003, is displayed once. **Src** contains “12”. However, it is included in the report because there is a related change indicated by the R in **Chg**.

Multiple Reports

You can generate any number of reports from the same Compare File and store each report in a separate sequential file. That way you can specify individual reports for different types of comparison results. In some instances, this may help to identify the differences.

Chapter 7. Conclusion

Compare provides the functionality necessary to efficiently and accurately evaluate the results of application testing. Most importantly, using the Optim solution supports the iterative process of application testing. Use Move to extract a subset of your production data and create a test database. Use Access to view and edit the test database. After executing your application, use Compare to analyze these "before" and "after" versions of the data. Then, if you need to revise your application, use Move to refresh the test database. After re-executing your application, use Compare again to verify the changes. You need not recreate the test data or respecify what data is to be compared, and you are always sure of executing against the same test data.

In addition to using Compare for application testing, you can use it to:

- Perform Regression Testing

  To ensure that application updates do not introduce new problems, you can use Compare to evaluate the data after executing the old version and the new version of an application against the same set of data.
- Verify Identical Databases

  To ensure that a database clone is identical to the original, you can use Compare to compare the two versions, averting any unnecessary surprises and preventing inaccurate test data.
- Identify Referential Integrity Violations

  To ensure that a database without DB2 RI rules does not contain invalid data, you can use Compare to extract a related set of data and compare that data to the original database to locate any orphan rows.

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