IBM

VisualAge Pacbase 2.5

DSMS ACCESS FACILITY
REFERENCE MANUAL

DDSMS000251A

Note

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First Edition (August 1998)

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VisualAge Pacbase Support
30, rue du Château des Rentiers
75640 PARIS Cedex 13
FRANCE

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1. INTRODUCTION

INTRODUCTION TO THE DSMS ACCESS FACILITY (DAF) FUNCTION

The DSMS Access Facility (DAF) function allows the user to extract information from the DSMS database via SQL statements.

RELATIONAL VIEW OF THE DSMS DATABASE

The DAF Function provides a relational description of the DSMS metamodel. This type of description is a prerequisite for the formulation of SQL queries.

A relational model is a tabular structure of data organized in columns. Relations between objects (databases, table spaces, tables, views, or indexes - but not the data itself) are correspondences between the table columns.

In the DAF tabular model:

. Each entity (standard entities is described by a set of Tables.

. Information pertaining to an entity definition or description is described by specific columns.

. Cross-references are described in two ways:

- By direct relations between two columns of different Tables,
- By "virtual" tables, whose columns are those identifying the two tables to be related and those representing the cross-references.

Tables are fully described in Chapter "DESCRIPTION OF DAF TABLES" of the "DAF TABLES" manual.

INTRODUCTION TO THE SQL LANGUAGE

The Structured Query Language (SQL) is the standard query language used with Relational Databases. Its syntax is similar to that of the English language.

This language is used to formulate queries, retrieve selected data, and update the queried database.

NOTE: The updating capability of the SQL language will not be addressed here.

An SQL query is defined by a SELECT statement (See Subchapter "SQL-PAF SYNTAX").

The Tables in a Relational Database are composed of rows (equivalent to records of a file).

An SQL query defines a subset of the information contained in the Relational Database.

In order to integrate SQL with the procedural languages used in business-oriented computing, the concept of the cursor has been associated with an SQL query.

A cursor makes the extracted rows available to a DAF user program. The cursor is defined and declared with a DECLARE CURSOR statement, which includes a SELECT statement that identifies the extracted rows. When a cursor is used, the program can retrieve each extracted row sequentially: the cursor must be opened (with an OPEN statement) before any rows are retrieved. A FETCH statement is used to retrieve the cursor's current row, and can be executed repeatedly until all rows are retrieved. Then, the cursor must be closed with a CLOSE statement.

STANDARD SQL QUERIES

With the DSMS Access Facility (DAF), the DSMS database can be accessed via the Structured Query Language (SQL), which is commonly used for Relational Databases.

Accesses are performed by the declaration and use of SQL cursors.

Several cursors can be processed at one time in order to access information pertaining to several cross-references.

Queries can be written directly in COBOL, described in all batch or on-line user programs, or generated by VisualAge Pacbase.
In all cases, the query is processed by the DAF Translator program (before the COBOL compilation), which translates the SQL statements into CALL instructions used by the DAF Extraction Sub-Program.

THE DAF EXTRACTION SUB-PROGRAM

This Sub-Program accesses and extracts data from the DSMS database. It retrieves the internal parameters built by the DAF Translator Program in order to perform the requested data extraction.

Extracted data is transmitted to the DAF user program in the Communication Area generated by the DAF Translator Program (COBOL Communication Area in the WORKING-STORAGE SECTION).

2. IMPLEMENTATION IN USER PROGRAMS

2.1. INTRODUCTION

INTRODUCTION

THE USER PROGRAM

DAF is implemented through a user on-line or batch program, either written directly in COBOL or generated by VisualAge Pacbase. The DAF Extraction Sub-Program generates all the accesses to the database.

In the user's program, the cursor(s) must first be declared via a DECLARE CURSOR statement in order to access the desired tables. For each declared Cursor, the command sequence is as follows:

CONNECT	Connects Cursor to a DSMS context (User, Library, and Database Session),
OPEN	Open Cursor, i.e. extraction from the
FETCH	Sequentially retrieve extracted rows,
CLOSE	Close Cursor.

The SET statement allows for the dynamic modification of the DAF Translator Program's operating parameters.

The INIT and QUIT statements perform technical initialization and termination operations according to the extraction mode and the hardware in use (e.g. File OPEN/CLOSE in batch mode).

THE DAF TRANSLATOR

SQL commands are inserted into a DAF user program and are translated into COBOL instructions before the COBOL compilation.

The DAF Translator transforms SQL statements into comment lines which precede the translated COBOL instructions.

The SQL-PAF DECLARE statement is translated into a declaration. Other SQL commands are translated into CALLs of the Extraction Sub-Program, except for the SET statement, which is not an SQL command and has a very special usage.

For more information, please refer to Paragraph "THE SET STATEMENT" in Subchapter "SQL-PAF SYNTAX".

The DAF Translator is parameterized by a comment line inserted into the DAF user program following the IDENTIFICATION DIVISION line. This parameter line, the description of which appears on the next page, is automatically generated if the program is developed with VisualAge Pacbase and if the 'EXP' operator is used on a Procedural Code (-P) line of the program.

For more details, please refer to Subchapter "DAF IMPLEMENTATION UNDER VISUALAGE PACBASE".

The DAF Translator parameter line is formatted as follows:

COLUMN	LENGTH	CONTENT
1	6	COBOL LINE NUMBER
7	1	* FOR COBOL COMMENT LINE
8	5	EXECUTION MODE: BATCH or ON-LINE
14	4	FIXED LABEL
19	3	LIBRARY CODE
23	5	SESSION NUMBER (& VERSION)
29	2	GENERATION VARIANT(S) (COBOL & MAP)
32	3	FIXED LABEL
36	1	DATABASE LANGUAGE CODE (A or F)
38	3	BATCH PROGRAM SKELETON
		ON-LINE PROGRAM SKELETON
		COBOL PROGRAM SKELETON
42	1	SKELETON LANGUAGE (A or F)
44	6	'SINGLE' OR 'DOUBLE' QUOTES DELIMITER

The Execution Mode is used to distinguish between batch and on-line. The Execution Mode that VisualAge Pacbase takes into account depends on the generator implemented on-site. The Execution Mode allows the DAF Translator to declare, as appropriate, the work areas specific to on-line and to generate the calls to the Extraction Sub-Program.

The Generation Variant taken into account by VisualAge Pacbase depends on the one specified on the Program Definition screen. It is used to adapt the generated syntax in function with the compiler.

The String Delimiter which VisualAge Pacbase takes into account depends on what was specified on the Library Definiton screen. It allows the DAF Translator to recognize the string delimiter for both generation and source analysis.

The Library and Session parameters allow the DAF Translator to connect to the appropriate DSMS database when it is processing a Cursor dealing with a User Entity Occurrence: the columns associated with User Entity Occurrences depend on the description of the corresponding User Entity. Therefore, the DAF Translator has to read this User Entity in the Library and Session where it is described in order to validate the SQL query.

The DAF Translator is a bilingual program. The first specified Language Code applies to error messages generated by the Translator. The second refers to the language used in the mnemonic coding of the Tables and Columns which describe the DSMS database.

This implementation of two language codes (English and French) allows a site to generate programs for another site using a different language code.

The line 2 generated by the VisualAge Pacbase generator is read by the DAF generator, but is not reproduced in the translated source.

The SET statement can be used to easily modify these parameters anytime during the actual translation process. For example, it may be necessary to change the Library Code one or more times.

THE DAF EXTRACTOR SUB-PROGRAM

The DAF Extractor Sub-Program manages accesses to the DSMS database.

This sub-program retrieves the internal parameters built by the DAF Translator and performs the selected data extraction as follows:

* When a CONNECT statement is issued, the Extractor establishes the user's connection, for the specified Cursor (authorization access validation, Library, and Database Session).

* When an OPEN statement is issued, the Extractor accesses the DSMS database, and stores the extracted rows in an Intermediary Workfile. The number of extracted rows may be parameterized for each Cursor (SIZE parameter within the CONNECT Statement).

* When a FETCH statement is issued, the Extractor retrieves the extracted rows, one by one, from the Temporary Workfile and transmits them to the user program Communication Area generated by the DAF Translator.

  Refer to Subchapter "DATABASE ACCESS OPTIMIZATION" which provides a detailed explanation of the mechanism used by the Extractor Sub-Program to manage the OPEN and FETCH statements.

* When a CLOSE statement is issued, the specified Cursor is closed.

The DAF extractor is also used in DUPD procedure, which updates in batch mode the DSMS database with DAF Tables sequential file.
For more information, refer to 'Development and Support Management System 2.5 - IBM - CICS / OS / VS' Operations manual, Chapter 'Batch Update from DAF Tables (DUPD)'.

THE INTERMEDIARY WORKFILE

The purpose of the Temporary Workfile is to store the rows extracted from the database after an OPEN statement is issued.

Extracted rows are retrieved one by one from the Intermediary Workfile for each FETCH statement. The maximum number of extracted rows may be parameterized for each Cursor (via the SIZE parameter in the CONNECT statement).

For more details, refer to Subchapters "SQL-PAF SYNTAX" and "DATABASE ACCESS OPTIMIZATION".

The Intermediary Workfile also contains technical parameters used by the DAF Extractor Sub-Program for Cursor management (See topic "SPECIFICATIONS FIELD" in Subchapter "THE TRANSLATED USER PROGRAM").

PHYSICAL DESCRIPTION

The Intermediary Workfile is an indexed sequential file with a variable format.

When this file is created for a batch job, its access key is composed of:

. A Cursor code,
. A Structure code,
. A Record number.

When this file is created for on-line use, it is used by all DAF applications and users, and its access key is composed of:

. A Conversation identifier,
. A Cursor code,
. A Structure code,
. A Record number.

CICS: In a CICS environment, there can be several DSMS databases; one Intermediary Workfile is created for each database.

2.2. SQL-PAF SYNTAX

SQL-PAF SYNTAX

Due to the nature of the first release of DAF, i.e., as an extraction tool, the SQL statements to be used with DAF are limited to database queries only. Creation, Modification, and Deletion statements are not taken into account.

GENERAL INFORMATION

To access the DSMS database through the DAF function, you have to declare, and then use, SQL Cursors.

For each table to be accessed, the user must declare a Cursor in the WORKING-STORAGE SECTION (DECLARE CURSOR statement). In the PROCEDURE DIVISION, the sequence of statements associated with a given Cursor is as follows:

CONNECT, OPEN, FETCH, and CLOSE.

OPEN, FETCH and CLOSE are standard SQL statements, while the CONNECT statement is specific to the DAF function. All four of these statements are designated as Cursor operation statements in SQL-PAF syntax.

A DAF user program can use up to 100 Cursors.

The INIT (initialization) and QUIT (termination) statements, which are independent of Cursors, must be issued, respectively, before and after any Cursor operation statements.

NOTE: All SQL-PAF sentences must be coded starting in COBOL column 12, must begin with EXEC PAF, and must end with END-EXEC.

CURSOR DECLARATION

An SQL Cursor is declared in the WORKING-STORAGE SECTION of the DAF user program by means of a DECLARE CURSOR statement.

In the DECLARE statement, the following keywords should be noted:

SELECT, FROM, WHERE, AND, and OR.

The syntax of the DECLARE CURSOR statement is as follows (values between parentheses are optional):

```
EXEC PAF DECLARE <cursor-code> CURSOR FOR
SELECT * FROM <table-code> (WHERE <condition(s)>)
END-EXEC
```

where:

- <cursor-code> is the four-character cursor identifier,
- SELECT here applies to the whole table, and is used to retrieve all table columns; in other words, columns cannot be selected individually. Thus, the syntax is always SELECT *.
- FROM cannot be used with a JOIN clause, and is therefore followed by just one table code.
- <table-code> identifies the DAF Table. Please refer to Chapter "DESCRIPTION OF DAF TABLES" for a complete list manual for a complete list of Table Codes.
- WHERE does not allow SUBSELECTs.
- <condition(s)>: Each condition applies to a table column and is indicated between parentheses.

Several conditions may be linked using the logical 'AND' and 'OR' operators. The total number of elementary conditions is limited to 50.

A condition is formatted as follows:

COLUMN OPERATOR OPERAND

where:

. COLUMN = column code

. OPERATOR may have the following values:

```
=   : equals
>   : is greater than
>=  : is greater than or equal to
<   : is less than
<=  : is less than or equal to
<>  : is different from
```

. OPERAND is either:

```
. Another column of the table,
. A COBOL constant,
. A DAF user program COBOL variable.
```

NOTE: Alphanumeric constants cannot exceed 60 characters. If this length is insufficient, an initialized COBOL variable can be used instead.

Numeric constants can only be unsigned integer constants and cannot exceed 18 digits. The DAF Translator does not validate the declaration of COBOL variables used as operands.

Limitations related to the use of the SELECT clause are not restrictive, since the ability to manage several cursors at the same time makes up for the inconvenience of mono-table accesses. Furthermore, coding a very complicated SQL query is often a tricky matter. The purpose of the DAF Function is not to provide a comprehensive SQL interface, but to allow its users to access any data contained in a database. Data is accessed at the DAF user program level.

For more information please refer to Subchapter "EMBEDDED DAF CURSORS" in this chapter.

CURSOR MANAGEMENT

Cursor operation statements are written in the PROCEDURE DIVISION of a DAF user program.

CONNECT: This is the first statement to be issued. It performs the connection to a DSMS context. This context can be modified as many times as needed.

The syntax of the CONNECT statement is as follows:

```
EXEC PAF CONNECT <cursor-code> TO
    USER = <user-code>
    PASS = <password>
    PRODUCT = <product-code>
    SUBSIDIARY = <subsidiary-code>
    SIZE = <maximum-number-of-rows>
    IDENT = <transaction-code>
    BASE = <database-code>
END-EXEC
```

The parameters to the right of the equal sign ('='), which are described below, must be either literals or COBOL variables.

USER	DSMS user code
PASS	DSMS user password
PRODUCT	DSMS product code
SUBSIDIARY	DSMS subsidiary code
SIZE	Maximum number of rows stored in the Intermediary Workfile
IDENT	Conversation transaction code
BASE	4-character DSMS code

All of the parameters in the CONNECT statement are required for the first cursor connection. The CONNECT statement is used to control the user and his password.

NOTES ON THE 'IDENT' AND 'BASE' PARAMETERS

These two parameters are only used in on-line DAF user programs.

The IDENT parameter is a 25-character field which identifies the on-line conversation using PAF. It is also part of the access key in the Intermediary Workfile. Its value depends on the TP Monitor in use. For complete information on the IDENT values, refer to "THE 'IDENT' PARAMETER" Subchapter.

The BASE parameter contains the four-character database code for access to the DSMS database and the DAF Intermediary Workfile. (The parameter is used only for IBM hardware in CICS).

NOTES ON THE 'SIZE' PARAMETER

The SIZE parameter value must be greater than zero. Otherwise, the DAF Extractor Sub-Program automatically sets it to "1".

OPEN: When this statement is issued, the Extractor Sub-Program accesses the DSMS database and writes, in the Intermediary Workfile, the rows selected (and extracted) according to the cursor declaration.

A cursor can be opened if it is already connected and if it has not yet been opened.

The syntax of the OPEN statement looks like this:

```
EXEC PAF OPEN <cursor-code> END-EXEC
```

FETCH: When this statement is issued, the Extractor Sub-Program sends the current retrieved row from the Intermediary Workfile to the DAF user program.

The cursor must be opened and there may be as many FETCH statements as necessary.

The syntax of the FETCH statement looks like this:

```
EXEC PAF FETCH <cursor-code> END-EXEC
```

NOTE: The standard syntax of the FETCH statement includes the keyword 'INTO', which allows each selected column to be associated with a COBOL field.

The PAF Extractor Sub-Program extracts ALL columns into a Communication Area, generated in the WORKING-STORAGE SECTION when a DECLARE statement is issued.

Thus, the keyword INTO (followed by the list of target COBOL fields) is not used in the SQL-PAF FETCH statement.

CLOSE: Only an opened cursor can be closed: a CLOSE statement can be issued only after an OPEN or a FETCH statement.

The syntax of the CLOSE statement is as follows:

```
EXEC PAF CLOSE <cursor-code> END-EXEC
```

THE SET STATEMENT

The SET statement is used to modify a number of parameters used by the DAF Translator.

These parameters are initialized by the second line (a COMMENT line following the IDENTIFICATION DIVISION) in a DAF user program. This line is described in this chapter, in the "INTRODUCTION" subchapter, paragraph "THE DAF TRANSLATOR".

After the specified parameters are actually updated, the PAF Translator sends the SET statement as just a Comment to the translated DAF user program. The SET statement is the only SQL-PAF statement which is not translated into COBOL.

The statement may be written in WSS or Procedure Division. However, if these parameters are not to be modified during the program, it is recommended to write the SET statement at the beginning of the Working Storage Section.

The syntax of the SET statement is as follows:

```
EXEC PAF SET
    LIB = <library code>
    DELIM = <delimiter>
    TYPE = <generation variant(s)>
    MODE = <execution mode>
    LINK = <calling mode>
    ROOT = <root>
    SESSION = <session and version>
END-EXEC
```

The syntax of the SET statement is similar to that of the CONNECT statement, in that if all or some of its parameters are to be modified, they do not all have to be entered, nor do they have to be entered in the order given above.

THE DAF TRANSLATOR PARAMETERS

The values of these parameters are purely alphanumeric and do not require a string delimiter.

EXAMPLE: In order to modify the LIB parameter, using the library code "PFA", the syntax would be as follows:

```
EXEC PAF SET LIB = PFA END-EXEC
```

DESCRIPTION OF PARAMETERS:

LIB is a three-character parameter. Its default value is the library from which the DAF user program is generated.

It is used to declare a cursor for a table of User Entity Occurrences (UEO's) described by User Entities not found in the library from which the DAF user program is generated.

DELIM is a six-character parameter. It is used to modify the delimiter using the following values:

SINGLE: for the sinqle quote ('),
DOUBLE: for the double quote (").

TYPE is a two-character parameter. It is used to modify the variants VISUALAGE PACBASE TYPE OF TP MONITOR and MAP TO GENERATE/ TYPE OF COBOL TO GENERATE.

EXAMPLE: When a DAF user program is written and generated with the VisualAge Pacbase Batch Systems Development component in an IBM CICS/MVS environment (Variants '00' or 'X0'), in order obtain an On-Line application to be executed in an IBM IMS/VS environment, the TYPE parameter value needs to be changed to '01' or 'X1' ('00' is automatically generated by the DAF Translator).

Refer to the ON-LINE SYSTEMS DEVELOPMENT and BATCH SYSTEMS DEVELOPMENT Reference Manuals for a list of the values of these variants.

MODE is a five-character parameter. It is used to modify the execution mode for users who are using the Batch generator to generate on-line programs (value of MODE = 'TP').

LINK is a six-character parameter. It is used to specify the calling mode of the extractor (STATIC or DYNAM) for static or dynamic calls, respectively. For CICS, this parameter is ignored and the translator generates a LINK statement for the call to the extractor. For batch DOS, the call is always dynamic and is executed using module PACDYNAM. For BULL DPS7 and DPS8 hardware, the statement is ignored for on-line processing, in which case the call is always static.

ROOT is a two-character parameter. It is used to modify the first two characters of the external names of the extraction sub-programs. This parameter is called 'ROOT', because the standard way to parameterize these sub-programs is to assign the first two characters of the root of the DSMS database to the external names of these sub-programs.

SESSION is a five-character parameter. It is used to modify the session. Its default value is the session in which the PAF user program is generated.

TECHNICAL INITIALIZATION AND TERMINATION

The INIT and QUIT statements allow the Extractor to perform technical initialization and termination operations which depend on the Operating System in use. As a result, both statements must be issued, respectively, before and after other SQL-PAF statements.

The syntax of the INIT statement looks like this:

```
EXEC PAF INIT END-EXEC
```

The syntax of the QUIT statement looks like this:

```
EXEC PAF QUIT END-EXEC
```

2.3. DATABASE ACCESS OPTIMIZATION

DATABASE ACCESS OPTIMIZATION

THE CHOICE OF THE TABLE

The choice of the table depends on the use of the extracted data.

For a program managing columns included only in a ENTX...... type table, it is preferable to call this table rather than the ENTDEF WHERE... table. Most of cross-references exist only if the cross-referenced entity is included (with a value different from a blank or zero); the cross-references are used only for ENTX.... table type.

EXAMPLE : ACCESS TO CHANGES WITH 'X' GRAVITY

. SELECT * FROM AMEXGRA WHERE CGRA = 'X'
Cross-references on Gravity and Changes.

. SELECT * FROM AMEDEF WHERE CGRA = 'X'
List of Changes and test on Gravity value (CGRA).

THE WHERE CLAUSE

Using the WHERE clause improves overall performance by optimizing Database accesses and reducing the volume of extracted data stored in the SYSDAF intermediary file.

THE SIZE PARAMETER

In order to optimize accesses to the DSMS database, the DAF Extractor reads several rows in advance. Advance reading avoids a systematic Read each time a row is fetched; systematic Reads cause systematic resets (START) in the Index (AN) file.

Advance reading may be seen as the logical equivalent of Input/Output BUFFERs used by File Access Methods implemented with any Operating System.

For each cursor, you can parameterize the number of rows read in advance by using the SIZE parameter in the DAF function's CONNECT statement.

MANAGEMENT OF ROWS READ BY THE DAF EXTRACTOR

The DAF Extractor reads the DSMS database and validates the row that has been read. If the result is valid, the row is stored in the Intermediary Workfile.

This process is repeated as long as the number of stored rows is less than the value of the SIZE parameter.

Processing ends when the Extractor READ function detects the last row for the declared cursor.

The Extractor READ function returns the number of rows actually read and an End-of-Cursor Indicator.

This Read function is systematically executed when a cursor OPEN statement is issued.

It may also be executed when a FETCH statement is issued. The purpose of a FETCH is mainly to read the Intermediary Workfile in order to retrieve a new row.

When the retrieved row is the last one to be read by the Extractor READ function, the function is executed once again if end-of-cursor has not been detected.

ACCESS OPTIMIZATION VIA THE SIZE PARAMETER

The SIZE parameter is a critical factor in the DAF Extractor's efficiency in terms of response time.

SETTING THE SIZE PARAMETER FOR AN ON-LINE DAF USER PROGRAM:

The value of the SIZE parameter should not be less than the number of rows fetched per screen (number of records displayed on the screen, for example). Based on a simple hypothesis that all rows which are read are also valid, the optimal value of the SIZE parameter is a multiple of the number of rows fetched per screen.

NOTE: If the on-line DAF user program includes screen branching operations, the optimal value of the SIZE parameter is equal to the number of rows fetched per screen.

SETTING THE SIZE PARAMETER FOR A BATCH DAF USER PROGRAM:

At first glance, it may seem appropriate to set the SIZE parameter to a large value in order to minimize the number of READs. However, a value which is too large would result in the dynamic creation of too many records for most indexed sequential file access methods.

The ideal in Batch is to sufficiently define the size of the Input/Output BUFFER for the Intermediary Workfile so that the READ function causes only logical input-outputs.

2.4. THE 'IDENT' PARAMETER

THE 'IDENT' PARAMETER

The purpose of the IDENT parameter is to uniquely identify a conversation in a multi-user environment.

This identification is therefore closely linked to the TP Monitor under which the translated DAF user application will be executed.

The recommendations below take into account the standard variables supplied with the On-line Monitor (terminal identifier, etc.).

CICS/MVS or DOS:

The EIBTRMID CICS variable identifies each terminal.

IMS/VS:

The name of the logical terminal is found in the IO/PCB field (S-IPCB-XNMTE variable in programs generated by the OLSD function).

DPS7 and DPS8:

The variable associated with the SYMBOLIC SOURCE is found in the COMMUNICATION SECTION (7-CD01-XTERM in programs generated by the OLSD function).

ICL: The system variable has no standard name. In programs generated by the OLSD function, it is the TERMINAL-NAME field in the INPUT-MESSAGE.

UNISYS SERIES A:

The system variable is called COMS-IN-STATION.

MS-DOS/OS2:

The Intermediary Workfile is managed locally, and on-line mode is identical to batch mode. Therefore, there is no IDENT parameter.

2.5. DAF IMPLEMENTATION UNDER VISUALAGE PACBASE

DAF IMPLEMENTATION UNDER VISUALAGE PACBASE

The DECLARE CURSOR clause must be entered in the WORKING-STORAGE SECTION.

It must therefore be inserted on Work Area (-W) lines in the Program or On-Line Screen.

"EXEC PAF" must start in the 5th position of the LEVEL OR SECTION field, and "END-EXEC" must be entered after the cursor declaration.

```
EXAMPLE:
        A LIN T LEVEL OR SECTION WORK AREA DESCRIPTION


                 100       EXEC PAF DECLARE CU01 CURSOR FOR
                 120       SELECT * FROM DELDEF
                 140       WHERE FDELIL = 5 END-EXEC
```

Except for the DECLARE CURSOR clause, all SQL-PAF statements are written on the Procedural Code (-P) lines of the DAF user Program or On-Line Screen. An EXP PAF Operator generates EXEC PAF and END-EXEC calls, which are found before and after all SQL-PAF statements, respectively.

```
EXAMPLE:
        A SF LIN OPE OPERANDS


                        EXP OPEN CU01
```

will generate:

```
EXEC PAF
OPEN CU01
END-EXEC
```

2.6. THE TRANSLATED USER PROGRAMS

THE TRANSLATED USER PROGRAM

Before COBOL compilation, the DAF Translator transforms SQL-PAF queries into COBOL declarations and instructions.

The EXEC PAF .... END-EXEC sequences are commented out in the COBOL program.

WORKING-STORAGE SECTION

The following phrase:

```
 DECLARE <cursor-code> CURSOR FOR SELECT * FROM <table-code>
```

generates the following data declarations in the WORKING- STORAGE SECTION, under Level 01 <cursor-code>-CURSOR, of the DAF user program:

- The Cursor Management field,
- The Specifications field, where the query is translated,
- The Communication Area, i.e., the selected DAF Table.

The two fields which are accessible in the program (Cursor Management Field and Communication Area) are prefixed by the cursor-code. The Specifications field is generated as a FILLER.

EXAMPLE: Extraction of Text Descriptions (TXTDSC Table) for Text Entity 'TEXT01', including Text Paragraphs greater than 'EE'. The cursor-code is TX04.

```
EXEC PAF  DECLARE TX04 CURSOR FOR SELECT * FROM
          TXTDSC WHERE CTXT = 'TEXT01' AND CPAR > 'EE'
END-EXEC
```

Grouped together under level 01:

```
01    TX04-CURSOR
```

the descriptions of these fields appear below:

CURSOR MANAGEMENT FIELD

```
       05      TX04-SAVE.
         10    FILLER        PIC X(06) VALUE 'TX0401'.
         10    TX04-TABCOD   PIC X(10) VALUE 'DELDEF    '.
         10    TX04-RETCOD   PIC 9(00002).
         10    TX04-ORDER    PIC X(00001).
         10    TX04-FI       PIC X(00001).
         10    TX04-FT       PIC X(00001).
         10    TX04-CUSRCU   PIC X(00008).
         10    TX04-CPSWCU   PIC X(00008).
         10    TX04-CPROCU   PIC X(00003).
         10    TX04-CSUBCU   PIC X(00005).
         10    TX04-NRECCU   PIC 9(00006).
         10    TX04-INTERN   PIC X(00034).
```

TABCOD Table code.

RETCOD Extractor Return Code.

"0": No error detected.
Other values are presented in chapter "ERROR MESSAGES", subchapter "THE EXTRACTOR".

ORDER Each DAF statement is identified by a number:

1 INIT
2 CONNECT
4 OPEN
6 FETCH
8 CLOSE
9 QUIT

FI End of cursor READ:

1 Read of cursor's last row,
0 Otherwise.

FT End of cursor processing:

1 Cursor FETCH beyond its last row,
0 Otherwise.

The other fields contain user parameters related to the CONNECT statement. The values of these parameters are automatically generated in the PROCEDURE DIVISION by the DAF Translator when the CONNECT statement is encountered.

CUSRCU	DSMS user code
CPSWCU	DSMS user password
CPROCU	DSMS product code for check at the connection
CSUBCU	DSMS subsidiary code for check at the connection
NRECCU	Max. number of records in the Intermed. Workfile
INTERN	Internal usage field

The Cursor Management field is called <cursor-code>-SAVE since, for an on-line DAF user program, this field has to be saved when the calling program returns control to the monitor.

The On-Line DAF Extractor actually backs up a representation of the query in the Specifications field <cursor-code>-TECH (see next paragraph) in the Temporary Workfile.

For an on-line DAF user program, the management field is the BATCH field preceded by the following two additional fields, which are used to identify the DSMS database and the terminal (see description of the CONNECT statement):

```
10    TX04-IDENT      PIC X(25).
10    TX04-BASE       PIC X(4).
```

The contents of both fields, <cursor-code>-SAVE and <cursor-code>-TECH, must not be modified.

SPECIFICATIONS FIELD

This field is generated at the following level:

```
       05      TX04-TECH.
```

This field is a variable length FILLER, where the query is translated for the DAF Extractor. The DAF user cannot access this field.

COMMUNICATION AREA

```
       05      TX04.
         10    TX04-LCTX     PIC X(00003).
         10    TX04-SCTX     PIC 9(00004).
         10    TX04-TCTX     PIC X(00001).
         10    TX04-NCTX     PIC X(00001).
         10    TX04-CTXT     PIC X(00006).
         10    TX04-CPAR     PIC X(00002).
         10    TX04-CLIN     PIC 9(00003).
         10    TX04-TLIN     PIC X(00001).
         10    TX04-DLINTX   PIC X(00060).
         10    TX04-CDEL     PIC X(00006).
```

PROCEDURE DIVISION

For each SQL-PAF statement in the PROCEDURE DIVISION, the following operations occur:

- the TX04-ORDER field is filled in,

- the Extractor Sub-Program is called and the entire TX04-CURSOR field is passed to it.

When a CONNECT statement is encountered, the Translator sends the user's parameters to the Cursor Management field.

When an OPEN statement is encountered, the Translator fills in (in some cases under specific conditions) the Specifications field (-TECH) when the cursor depends on one or more COBOL fields.

2.7. EMBEDDED DAF CURSORS

EMBEDDED DAF CURSORS

LIMITATIONS OF THE SQL-PAF SYNTAX

The SQL-PAF syntax uses a sub-set of the SQL language. In particular, cursors cannot be defined with embedded SELECT clauses. Embedded SELECT clauses are useful in obtaining information conditioned by a sequence of cross-references such as, a List of Data Elements called in Segments used in Programs.

However, this limitation is not too restrictive since you can declare several cursors (maximum number = 100). When a cursor depends on a COBOL field which belongs to the Communication Area of another cursor, both cursors act as one cursor using embedded SELECT clauses.

EMBEDDED CURSORS: EXAMPLE

Suppose a user wants to obtain, for each Data Structure in the DSMS database, the list of Programs that use it.

This query involves the following Tables:

DSTDEF Data Structure Definition,
PGMDST Program Call of Data Structures,

and the following Columns:

```
CDST Data Structure code,
CPGM Program code.
```

The SELECT clause of a standard SQL query is written as follows:

SELECT * FROM PGMDST WHERE
CDST = (SELECT CDST FROM DSTDEF)

With the SQL-PAF syntax, the same query uses two embedded cursors:

```
DECLARE LCD CURSOR FOR SELECT * FROM DSTDEF
DECLARE PGCD CURSOR FOR SELECT * FROM PGMDST
WHERE CDST = LCD-CDST
```

The first cursor, coded LCD, provides the list of all Data Structures. The second cursor, coded PGCD, provides the list of Programs using the Data Structure coded LCD-CDST, i.e., the code of the Data Structure currently fetched in the first cursor.

In the PROCEDURE DIVISION, after both cursors are connected, the LCD cursor is opened. As long as LCD-FT is not equal to one (i.e., the LCD cursor is still open), each time a FETCH statement is issued on the LCD cursor, an OPEN statement will be issued on the PGCD cursor. the PGCD cursor is issued. This OPEN allows the code of the next Data Structure to be moved to the LCD-CDST field.

After all FETCH statements are issued for the PGCD cursor, the cursor is closed, and another FETCH statement is issued for the LCD cursor.

In this way, you can simulate, through embedded cursor processing, a single cursor defined by embedded SELECT clauses.

REMINDER: Up to 100 cursors may be used by a DAF user program.

2.8. EXECUTION OF DAF USER PROGRAMS

EXECUTION OF DAF USER PROGRAMS

BATCH

Each time a Batch DAF user program is executed, you have to create and declare the Intermediary Workfile at the beginning of the job stream (and possibly delete the same file if it was previously created).

This file has the following characteristics:

. Indexed sequential access.

. Key length = 12.

. Maximum record size = 468.

. Average record size = 170.

Then, in order to execute the batch DAF user program, the DSMS database files and the Intermediary Workfile have to be declared in the JCL. For more details, refer to the JCL examples in the operations manual.

For MVS sites, a PAC7LS parameter file can be used to enable the LSR option on a BATCH extraction.

ON-LINE

The Intermediary Workfile has the following characteristics when used with an on-line DAF user program:

. Indexed sequential access.

. Key length = 37, starting in position 2.

. Maximum record size = 539.

. Average record size = 200.

3. EXAMPLES OF PROGRAMS USING DAF

3.1. INTRODUCTION

INTRODUCTION

The purpose of this chapter is to present two examples of programs (batch and on-line) using DAF. Additionally, it suggests ways to use DAF programs (standard quality control, DSMS database administration, etc.).

The first program example, 'DAFEX1', is a batch program. It builds a list of all the Changes with Type = TY and without closed related Event. Two cursors must be declared: one for the list of Changes with TY type and one for the Events related. This batch program is a good example of how to use embedded cursors.

The second program example, 'DAFEX2', is a dialogue which builds the list of Events that do not conform to a specific local standard (required steps, External Reference on XXOF database, and defined amount of work). This program uses only one cursor (for the screen definition), and manages screen scrolling. This on-line program provides an example of how to transmit the DAF context between each iteration of a dialogue.

3.2. BATCH EXAMPLE

BATCH EXAMPLE

OBJECTIVE:

- To list the Changes with Type = TY and whose related events are closed.

DAF Cursor Declarations:

- CU01 selects 'TY'-type Changes.
- CU02 (opened for each change found by CU01) the list of closed related events.

Procedural logic:

- F02BA: DAF initialization.
- F02CA: CU01 Cursor Connection. The user code and password are hard-coded but could be obtained through a Read of an input file.
- FO2DA: CU02 Cursor Connection.
- F21BA: Opening the CU01 Cursor. This statement involves reading the cross references on 'ty' type and the 'PAC' product Changes. It also involves writing them in the DAF workfile.
- F21CA: Fetching the definition screens, i.e., the screens are read one-by-one from the DAF workfile (FETCH statement).

- F21DA: As long as the end-of-cursor is not reached (CU01-FI = '0'), the CU02 Cursor is opened for each read change. This Cursor selects only closed events related to the change. Therefore, an immediate end-of-cursor (CU02-FI = '1') after the first FETCH means that this change does not have a related closed event. In this case, a line is formatted and printed on a Report. The CU02 Cursor is closed so that it can be reopened for the next element of the CU01 Cursor.

- F79: When all of the Changes have been read by FETCH, the CU01 Cursor is closed and a QUIT statement is issued in order to close the database files and the DAF workfile.

```
 --------------------------------------------------------------------------------
 !                                                             *PTJML.D474.CIV.2020!
 ! PROGRAM DEFINITION....... DAFEX1                                                !
 !                                                                                 !
 ! PROGRAM NAME.......................: AM."TY"                                     !
 !                                                                                 !
 ! CODE FOR SEQUENCE OF GENERATION....: DAFEX1                                      !
 !                                                                                 !
 ! TYPE OF CODE TO GENERATE...........: 0                                           !
 ! COBOL NUMBERING AND ALIGNMENT OPT..:                                             !
 ! CONTROL CARDS IN FRONT OF PROGRAM..:                                             !
 ! CONTROL CARDS IN BACK OF PROGRAM...:                                             !
 ! COBOL PROGRAM-ID...................: DAFEX1                                      !
 ! MODE OF PROGRAMMING................: P                                           !
 ! TYPE AND STRUCTURE OF PROGRAM......: B                                           !
 ! PROGRAM CLASSIFICATION CODE........: P   PROGRAM                                 !
 ! TYPE OF PRESENCE VALIDATION........:                                             !
 ! SQL INDICATORS GENERATION WITH '-'.:                                             !
 !                                                                                 !
 !                                                                                 !
 ! EXPLICIT KEYWORDS..:                                                            !
 !                                                                                 !
 ! SESSION NUMBER.....: 2013        LIBRARY......: CIV    LOCK....:                !
 !                                                                                 !
 ! O: C1 CH: Pdafex1                     ACTION:                                   !
 --------------------------------------------------------------------------------

 --------------------------------------------------------------------------------
 !                                                             *PTJML.D474.CIV.2020!
 ! DATA STRUCTURES USED IN PROGRAM :    DAFEX1 AM."TY"                 NAME     !
 !                                                                                 !
 ! A DP CO : DL EXTERN OARFU BLOCK T  B M U RE SE L UNIT C  SELECTION F E R L PL!
 !   PR    : PR PRLIST SSFOU     0 R      I                 A         I     1   !
 !         :    STAT.FLD:             ACC. KEY:             RECTYPEL            !
 !         :                                                                      !
 !         :    STAT.FLD:             ACC. KEY:             RECTYPEL            !
 !         :                                                                      !
 !         :    STAT.FLD:             ACC. KEY:             RECTYPEL            !
 !         :                                                                      !
 !         :    STAT.FLD:             ACC. KEY:             RECTYPEL            !
 !         :                                                                      !
 !         :    STAT.FLD:             ACC. KEY:             RECTYPEL            !
 !         :                                                                      !
 !         :    STAT.FLD:             ACC. KEY:             RECTYPEL            !
 !         :                                                                      !
 !         :    STAT.FLD:             ACC. KEY:             RECTYPEL            !
 !         :                                                                      !
 !         :    STAT.FLD:             ACC. KEY:             RECTYPEL            !
 !         :                                                                      !
 !         :    STAT.FLD:             ACC. KEY:             RECTYPEL            !
 !                                                                                 !
 ! O: C1 CH: -CD                                                                   !
 --------------------------------------------------------------------------------
 --------------------------------------------------------------------------------
 !                                                            *PTJML.D474.CIV.2020!
 ! WORK AREAS..........ENTITY TYPE P DAFEX1 AM."TY"                               !
 !                                                                                !
 ! CODE FOR PLACEMENT..:      BA                                                  !
 ! A LIN T LEVEL OR SECTION WORK AREA DESCRIPTION                           OCCURS!
 !   100 * PROPERTIES LIST                                                        !
 !   110       EXEC PAF DECLARE CU01 CURSOR FOR                                   !
 !   120       SELECT * FROM DELDEF WHERE                                         !
 !   130       TDEL = 'P'                                                         !
 !   140       END-EXEC                                                           !
 !   200 * LIST OF RELATIONAL NAMES OF A PROPERTY                                 !
 !   210       EXEC PAF DECLARE CU02 CURSOR FOR                                   !
 !   220       SELECT * FROM DELDSC WHERE                                         !
 !   230       CDEL = CU01-CDEL AND                                               !
 !   240       TLIN = 'R'                                                         !
 !   250       END-EXEC                                                           !
 !                                                                                !
 !                                                                                !
 !                                                                                !
 !                                                                                !
 !                                                                                !
 !                                                                                !
 !                                                                                !
 ! O: C1 CH: -W                                                                   !
 --------------------------------------------------------------------------------
```

```
 --------------------------------------------------------------------------------
 !                                                            *PTJE.PDEV.T01.6080T!
 ! PROCEDURAL CODE P DAFEX1 AM."TY"                                FUNCTION: 02   !
 !                                                                                !
 ! A SS NLG OPE OPERANDS                         LVTY CONDITION                   !
 !          N   INITIALIZATION AND CONNECTIONS   05BL                             !
 ! - -- --- --- -------------------------------- ---- -------------------------!
 !   BA     N   INITIALIZATION                   10BL                             !
 !   BA 100 EXP INIT                                                              !
 ! - -- --- --- -------------------------------- ---- -------------------------!
 !   CA     N   CONNECTION OF CU01               10BL                             !
 !   CA 100 EXP CONNECT CU01 TO                                                   !
 !   CA 110     USER    = 'USER'                                                  !
 !   CA 120     PASS    = 'PASS'                                                  !
 !   CA 130     PRODUCT = 'PAC'                                                   !
 !   CA 140     SUBSID. = 'FI'                                                    !
 !   CA 160     SIZE    = 40                                                      !
 !   CA 220 CU01 CONNECT ERROR                   99IT CU01-CODRET NOT = ZERO      !
 !   CA 230                          CU01-CODRET                                  !
 !   CA 240 GFT                                                                   !
 ! - -- --- --- -------------------------------- ---- -------------------------!
 !   DA     N   CONNECTION OF CU02               10BL                             !
 !   DA 100 EXP CONNECT CU02 TO                                                   !
 !                                                                                !
 ! O: C1 CH: -P02                                                                 !
 !                                                                                !
 --------------------------------------------------------------------------------
 --------------------------------------------------------------------------------
 !                                                           *PTJE.PDEV.T01.6080T!
 ! PROCEDURAL CODE P DAFEX1 AM."TY"                                FUNCTION: 02   !
 !                                                                                !
 ! A SS NLG OPE OPERANDS                         NVTY CONDITION                   !
 !   DA 110     USER    = 'USER'                                                  !
 !   DA 120     PASS    = 'PASS'                                                  !
 !   DA 130     PRODUCT = 'PAC'                                                   !
 !   DA 130     SUBSID. = 'FI'                                                    !
 !   DA 160     SIZE    = 1                                                       !
 !   DA 220 CU02 CONNECT ERROR                   99IT CU02-CODRET NOT = ZERO      !
 !   DA 230                          CU02-CODRET                                  !
 !   DA 240 GFT                                                                   !
 ! - -- --- --- -------------------------------- ---- -------------------------!
 !                                                                                !
 !                                                                                !
 !                                                                                !
 !                                                                                !
 !                                                                                !
 !                                                                                !
 !                                                                                !
 !                                                                                !
 !                                                                                !
 !                                                                                !
 ! O: C1 CH:                                                                      !
 !                                                                                !
 --------------------------------------------------------------------------------
```

```
 --------------------------------------------------------------------------------
 !                                                           *PTJE.PDEV.T01.6080T!
 ! PROCEDURAL CODE P DAFEX1 AM."TY"                                FUNCTION: 21   !
 !                                                                                !
 ! A SS NLG OPE OPERANDS                         NVTY CONDITION                   !
 !          N   SEARCH                           05BL                             !
 ! - -- --- --- -------------------------------- ---- -------------------------!
 !          N   SEARCH                           05BL                             !
 ! - -- --- --- -------------------------------- ---- -------------------------!
 !   BA     N   OPEN THE "TY" CHANGE LIST        10BL                             !
 !   BA 100 EXP OPEN CU01                                                         !
 !   BA 120 MES CU01 OPEN ERROR     CU01-CODRET  99IT CU01-CODRET NOT = ZERO      !
 !   BA 130 GFT                                                                   !
 ! - -- --- --- -------------------------------- ---- -------------------------!
 !   CA     N   READ CHANGES              1 A 1  10DW CU01-FI = '0'               !
 !   CA 100 EXP FETCH CU01                                                        !
 !   CA 120 MES CU01 FETCH ERROR   ' CU01-CODRET 99IT CU01-CODRET NOT = ZERO      !
 !   CA 130 GFT                                                                   !
 ! - -- --- --- -------------------------------- ---- -------------------------!
 !   DA     N   RELATIONAL CLOSED EVENTS         15BL                             !
 !   DA 100 *   OPEN                                                              !
 !   DA 110 EXP OPEN CU02                                                         !
 !   DA 120 MES CU02 OPEN ERROR     CU02-CODRET  99IT CU02-CODRET NOT = ZERO      !
 !   DA 130 GFT                                                                   !
 !   DA 200 *   READ                                                              !
 !                                                                                !
 ! O: C1 CH: -p21                                                                 !
 !                                                                                !
 --------------------------------------------------------------------------------
 --------------------------------------------------------------------------------
 !                                                            *PTJE.PDEV.T01.6080T!
 ! P PROGRAM PROCESSING    DF0010 AM."TY"                                : 21   !
 !                                                                              !
 ! A SS NLG OPE OPERAND                         NVTY CONDITION                  !
 !   DA 210 EXP FETCH CU02                                                      !
 !   DA 220 MES 'FETCH ERROR  CU02 ' CU02-CODRET 99IT CU02-CODRET NOT = ZERO    !
 !   DA 230 GFT                                                                 !
 !   DA 300 *   NO CLOSED EVENTS: PRINT   99IT CU02-FT = '1'                    !
 !   DA 310 P   F8D                                                             !
 !   DA 400 *   CLOSING                         99BL                            !
 !   DA 410 EXP CLOSE CU02                                                      !
 ! - -- --- --- ------------------------------ ---- -------------------------!
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 ! O: C1 CH:                                                                    !
 !                                                                              !
 --------------------------------------------------------------------------------
```

```
 --------------------------------------------------------------------------------
 !                                                            *PTJML.D474.CIV.2020!
 ! PROCEDURAL CODE  P DAFEX1 AM."TY"                                FUNCTION: 79   !
 !                                                                              !
 ! A SF LIN OPE OPERANDS                        LVTY CONDITION                  !
 !          N   DISCONNECT FROM PAF             05BL                            !
 !      100 EXP CLOSE CU01                                                      !
 !      110 EXP QUIT                                                            !
 !      120 GFT                                                                 !
 ! - -- --- --- ------------------------------ ---- -------------------------!
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 ! *** END ***                                                                  !
 ! O: C1 CH: -P79                                                               !
 !                                                                              !
 --------------------------------------------------------------------------------
 --------------------------------------------------------------------------------
 !                                                             *PTJML.D474.CIV.2020!
 ! REPORT DEFINITION.....: DPD                                                     !
 !                                                                                 !
 ! NAME..................: AM."TY"                                                 !
 !                                                                                 !
 ! COMMENTS..............:                                                         !
 !                                                                                 !
 ! NATURE................: E REPORT                                                !
 ! PRINTER TYPE..........: L                                                       !
 !                                                                                 !
 ! LINE LENGTH...........: 132                                                     !
 ! FORMAT FOR TOTALS     : INTEGER........: 11                                     !
 !                         DECIMAL PLACES.: 07                                     !
 !                                                                                 !
 !                                                                                 !
 !                                                                                 !
 !                                                                                 !
 ! EXPLICIT KEYWORDS..:                                                            !
 !                                                                                 !
 !                                                                                 !
 !                                                                                 !
 ! SESSION NUMBER.....: 2013        LIBRARY......: CIV    LOCK....:                !
 !                                                                                 !
 ! O: C1 CH: Rpra                        ACTION:                                   !
 --------------------------------------------------------------------------------

 --------------------------------------------------------------------------------
 !                                                             *PTJML.D474.CIV.2020!
 ! REPORT LAYOUT :         AM."TY"                                      LENGTH= 132!
 !                                                                                 !
 ! A LN CP S          1    1    2    2    3    3    4    4    5    5    6    6 !
 !           1...5....0....5....0....5....0....5....0....5....0....5....0....5.!
 !   00  1                                                                     !
 !   03  2                       LIST OF PROPERTIES WITHOUT RELATIONAL NAME !
 !   06  3                       ------------------------------------------ !
 !   09  4    ---------------------------------------------------------------!
 !   12  5    I  CODE  I           PROPERTY NAME             I INP.  FORM. I IN!
 !   15  4    ---------------------------------------------------------------!
 !   18  6    I        I                                      I             I   !
 !   21  4    ---------------------------------------------------------------!
 !                                                                          !
 !                                                                          !
 !                                                                          !
 !                                                                          !
 !                                                                          !
 !                                                                          !
 !                                                                          !
 !                                                                          !
 !                                                                          !
 !                                                                          !
 ! O: C1 CH: -L                                                             !
 --------------------------------------------------------------------------------
 --------------------------------------------------------------------------------
 !                                                             *PTJML.D474.CIV.2020!
 ! REPORT DESCRIPTION:       PRA AM."TY"                                          !
 !                                                                              !
 ! A:   LINE LENGTH:    132 LI PAGE:   60 CAT TBL INST:    WR OPT:   SECTION: 00!
 !      COMMENTS....:                CONDITIONS                                 !
 !                                                                              !
 ! A CA LIN T TLI ST CP SKP FUSF COMMENTS      CONDITIONS                       !
 !   BA 010        1 01 01*      HEADER        5-PR00-ALC NOT < 5-PR00-ALCM     !
 !   BA 030          02 01                                                      !
 !   BA 050          03 01                                                      !
 !   BA 070          04 01                                                      !
 !   BA 090          05 01                                                      !
 !   BA 110          04 01                                                      !
 ! - -- --- - --- -- -- --- ---- ------------ --------------------------------!
 !   CA 010        2 06 01       DETAIL                                         !
 ! - -- --- - --- -- -- --- ---- ------------ --------------------------------!
 !   DA 010          04 01       FOOTER        5-PR00-ALC NOT < 5-PR00-ALCM OR  !
 !   DA 020                                    CU01-FI = '1'                    !
 ! - -- --- - --- -- -- --- ---- ------------ --------------------------------!
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 ! O: C1 CH: -D                                                                 !
 --------------------------------------------------------------------------------
```

```
 --------------------------------------------------------------------------------
 !                                                             *PTJE.PDEV.T01.6080T!
 ! REPORT STRUCTURES        PRF AM."TY"                                         !
 !                                                                              !
 ! A ST ELEM   L : STA C O W FFNNRUBRIQIND CONDITION                      LIBR.!
 !   01 XPAGE  0 : 112   M 5 DP00DCP                                      2013 !
 ! - -- ------ - : --- - - - ------------- ------------------------------ -----!
 !   02 CPRO   0 :   6   M   CU01CPRO                                     2013 !
 !   02 CAME   0 :  16   M   CU01CAME                                     2013 !
 !   02 OFER   0 :  28   M   CU01OFER                                     2013 !
 ! - -- ------ - : --- - - - ------------- ------------------------------ -----!
 !               :                                                              !
 !               :                                                              !
 !               :                                                              !
 !               :                                                              !
 !               :                                                              !
 !               :                                                              !
 !               :                                                              !
 !               :                                                              !
 !               :                                                              !
 !               :                                                              !
 !               :                                                              !
 !               :                                                              !
 ! *** FIN ***                                                                  !
 ! O: C1 CH: -CE                                                                !
 --------------------------------------------------------------------------------
```

3.3. ON-LINE EXAMPLE

ON-LINE EXAMPLE

OBJECTIVE:

- To list the Changes that do not conform to a particular local standard.

DAF Cursor Declarations:

- CU01 selects the Changes definition files whose first step, the External Reference database or the amount of work, differs from those defined by the program user.

Procedural logic:

- F02 : DAF initialization only for the first entry into the program (EIBCALEN = '0').

- F06CA: CU01 Cursor Connection. The user code and password are hard-coded but could be entered on a menu and passed via the COMMAREA. The DSMS database code must be specified (YYOF). In addition, the terminal code (EIBTRMID) is assigned to the DAF 'IDENT' parameter in order to ensure that the keys between conversations in the DAF file are unique. The 'SIZE' parameter is set to '10', which corresponds to the number of repeated lines on the screen. Only the number of screens necessary for display are read, in order to avoid on-line reads that are too long and may prove to be pointless if a user ends up exiting the transaction without consulting the whole list.

In this example, the F06 function is executed only on the first entry into the program. Thus, the CONNECT and OPEN statements are issued only once. This example does not take into account interactive modifications of selection criteria.

- F06DA: Opening the CU01 Cursor. This statement causes screen definitions which do not conform to a local standard to be read and stored in the DAF workfile.

- F06EA: The field to save the CU01 Cursor (CU01-SAVE) is transferred to a backup field in the COMMAREA.

- F4031: Closing the CU01 Cursor and executing the DAF CLOSE and QUIT statements.

- F52BA: Retrieving the CU01-SAVE field from the COMMAREA. If all records have been fetched, the Cursor is closed.

- F60PF: If the last record has not yet been fetched, and as long as the repetitive category of the screen is being processed, the next record is fetched.

- F60PQ: If the last record as been fetched, the "END" message is written and an exit from the iteration is performed.

- F75: If no error is detected, the field to save the CU01 Cursor (CU01-SAVE) is transferred to a backup field in the COMMAREA.

```
--------------------------------------------------------------------------------
!                                                            *PTJE.PDEV.T01.6080T!
! DIALOGUE DEFINITION ...............: DF                                        !
!                                                                                !
! DIALOGUE NAME .....................: DAF QUERIES                               !
!                                                                                !
! SCREEN TYPE .......................:          STANDARD SCREEN                  !
! SCREEN SIZE (LINES, COLIMNS) ..... :   24      080                             !
! PRESENTATION, TABULATION, INITIAL. :   L       01                              !
!  6080 T      LIBRARY : T01         LOCK:                                       !
!                                                                                !
!                                     LABEL   DISPLAY  INPUT   ERRORLUR  Z.ERR!
! INTENSITY ATTRIBUTE ...............:   N       N        N        N        B  !
! PRESENTATION ATTRIBUTE ............:   N       N        N        R        B  !
! COLOR ATTRIBTUTE ..................:   W       W        W        P        W  !
!                                                                                !
! VARIANTS ..........................:   0   0    IBM OS CICS (PROG. ET MAP BMS!
! CARDS BEFORE, CARDS AFTER .........:   CC      (PROGRAM)      KK       (MAP) !
! EXTERNAL NAMES ....................:           (PROGRAM)               (MAP) !
! TRANSACTION .......................:                                           !
!                                                                                !
! ASSOCIATED KEY WORD: PAF                                                       !
! SESSION NUMBER                                                                 !
!                                                                                !
! O: C1 CH: Odf0010                    ACTION:                                   !
--------------------------------------------------------------------------------

--------------------------------------------------------------------------------
!                                                            *PTJE.PDEV.T01.6080T!
! SCREEN DEFINITION .................: DF0010                                    !
!                                                                                !
! SCREEN NAME .......................: Non-standard changes                      !
!                                                                                !
! SCREEN TYPE .......................:          STANDARD SCREEN                  !
! SCREEN SIZE (LINES,COLUMNS) .......:   24      080                             !
! PRESENTATION, TABULATION, INITIAL. :   L       01                              !
! CALL OF DOC. SCREEN, DATA ELT .....:   04      05                              !
!                                                                                !
!                                     LABEL   DISPLAY  INPUT   ERROR LA  Z.ERR!
! INTENSITY ATTRIBUTE ...............:   N       N        N        N        B  !
! PRESENTATION ATTRIBUTE ............:   N       N        N        R        B  !
! COLOR ATTRIBUTE ...................:   W       W        W        P        W  !
!                                                                                !
! VARIANTS ..... ....................: * X   0    IBM VS2 CICS (PRG.AND MAP.BMS!
! CARDS BEFORE, CARDS AFTER .........: * C9       (PROGRAM)      KK       (MAP) !
! EXTERNAL NAMES ....................:   D1PDAF01(PROGRAM)      D1MDAF1  (MAP) !
! TRANSACTION .......................: * DAF1                                    !
!                                                                                !
! ASSOCIATED KEY WORDS:                                                          !
! SESSION NUMBER .....: 6080 T      LIBRARY: T01          LOCK:                  !
!                                                                                !
! O: C1 CH: Odf0010                    ACTION:                                   !
--------------------------------------------------------------------------------
```

```
 --------------------------------------------------------------------------------
 !                                                          *PTJML.D474.CIV.2020!
 ! ON-LINE SCREEN X-REF'S TO SCREENS FOR ON-LINE SCREEN : DF0010                 !
 !                                                                              !
 ! SCREEN : LIN  D.ELEM  P LN COL N P C HR VR  C P O SEG D.ELEM  W SEG D.ELEM LV!
 ! -----------------------------------------------------------------------------!
 ! ------- CALL OF  T  TYPE  (TITLE) -------------------------------------------!
 ! DF0010   020  D                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 ! O: C1 CH: -XO                                                                !
 --------------------------------------------------------------------------------

 --------------------------------------------------------------------------------
 !                                                          *PTJE.PDEV.T01.6080T!
 ! SCREEN DESCRIPTION     DF0010 NON STANDARD CHANGES                           !
 !                                                                              !
 ! A NLG : ELEMT. . PHYSICAL ATTRIBUTS    .  UPDATE CHECK     .  DISPLAY        !
 !       :        . T LN COL N P C RH RV  .  P T U SEG ELT.   .  W SEG ELT.  NV !
 ! .............................................................................!
 !   010 : PFKEY  .          V            .    O V A          .    EN           !
 !   011 :        .                       .      V S          .    01           !
 !   012 :        .                       .      G            .    02           !
 !   020 : DF0010 . A 01 025 T            .                   .                 !
 !   025 : PAFVUE .   02 025 V            .                   .                 !
 !   040 :        .   04 015 L            .                   .                 !
 !   045 :        .      001 L            .                   .                 !
 !   060 : CPH1   .   02 001 V            .  R                .                 !
 !   100 : CBASX  .   01 001 V            .  P                .                 !
 !   130 :        .   01 001 L            .                   .                 !
 !   135 :        .   01 001 L            .                   .                 !
 !   140 : RGROUP .   01 001 R 3      10  .                   .                 !
 !   160 : CAME   .      003 P            .                   .    CU01         !
 !   180 : CPH1   .      003 P            .                   .    CU01         !
 !   200 : CPH2   .      003 P            .                   .    CU01         !
 !   210 : CBASX  .      003 P            .                   .    CU01         !
 !                                                                              !
 ! O: C1 CH: -CE                                                                !
 --------------------------------------------------------------------------------
 --------------------------------------------------------------------------------
 !                                                            *PTJML.D474.CIV.2020!
 ! SCREEN CALL OF ELEM... DF0010 LIST OF NON-STANDARD CHANGES                     !
 !                                                                                !
 ! A LIN : D.ELEM . PHYSICAL ATTRIBUTES   . VALIDATION UPDATE .  DISPLAY          !
 !       :        . P LN COL N L C HR VR  .  P V U UPD TARGET .  S SOURCE     LV !
 ! ..............................................................................!
 !   220 : ODELIC .      003 P            .                   .    CU01           !
 !   240 : OSCRHS .      003 P            .                   .    CU01           !
 !   260 : OSCRHE .      003 P            .                   .    CU01           !
 !   900 : ZGROUP . A 23 001 Z            .                   .                   !
 !   920 : ERMSG  .      001 P F          .                   .                   !
 !   940 :        . A 24 001 L            .                   .                   !
 !   960 :        .      001 L            .                   .                   !
 !   980 :        .      001 L            .                   .                   !
 !       :        .                       .                   .                   !
 !       :        .                       .                   .                   !
 !       :        .                       .                   .                   !
 !       :        .                       .                   .                   !
 !       :        .                       .                   .                   !
 !       :        .                       .                   .                   !
 !       :        .                       .                   .                   !
 !       :        .                       .                   .                   !
 !                                                                                !
 ! O: C1 CH:                                                                      !
 --------------------------------------------------------------------------------

 --------------------------------------------------------------------------------
 !                                                            *PTJML.D474.CIV.2020!
 ! SCREEN CALL OF ELEM... DF0010 LIST OF NON-STANDARD CHANGES                     !
 !                                                                                !
 ! A LIN : D.ELEM . PHYSICAL ATTRIBUTES         . LABEL                           !
 !       :        . P LN COL N L HR VR IN PR CO . T LITERALS                      !
 ! ..............................................................................!
 !   010 : PFKEY  .          V                  .                                 !
 !   011 :        .                             .                                 !
 !   012 :        .                             .                                 !
 !   020 : DF0010 . A 01 025 T                  .                                 !
 !   025 : PFVIEW .   02 025 V                  . I C                             !
 !   040 :        .   02 015 L                  .   PLEASE ENTER THE STANDARD/  !
 !   045 :        .      001 L                  .   CHANGE CHARACTERISTICS:/    !
 !   060 : ODELL1 .   02 001 V                  . I S                             !
 !   080 : ODELI1 .          V                  . I _                             !
 !   100 : OSCRH1 .   01 001 V                  . I 11                            !
 !   120 : OSCRH2 .          V                  . I 12                            !
 !   130 :        .   01 001 L                  . A 079-                          !
 !   140 : RGROUP .   01 001 R 3    10          .                                 !
 !   160 : CSCR   .      003 P                  .                                 !
 !   180 : LSCR   .      003 P                  .                                 !
 !   200 : ODELLB .      003 P                  .                                 !
 !                                                                                !
 ! O: C2 CH: -CE                                                                  !
 --------------------------------------------------------------------------------
```

```
--------------------------------------------------------------------------------
!                                                            *PTJML.D474.CIV.2020!
! SCREEN CALL OF ELEM... DF0010 LIST OF NON-STANDARD CHANGES                     !
!                                                                                !
! A LIN : D.ELEM . PHYSICAL ATTRIBUTES          . LABEL                          !
!       :        . P LN COL N L HR VR IN PR CO . T LITERALS                      !
! ................................................................................
!   220 : ODELIC .      003 P                   .                                !
!   240 : OSCRHS .      003 P                   .                                !
!   260 : OSCRHE .      003 P                   .                                !
!   900 : ZGROUP . A 23 001 Z                   .                                !
!   920 : ERMSG  .      001 P F                 .                                !
!   940 :        . A 24 001 L                   .   ENTER: DISPLAY, PF1: SCRLL,/!
!   960 :        .      001 L                   .   PF2: EXIT, PF11: SCRN HELP,/!
!   980 :        .      001 L                   .   PF12: FIELD HELP/            !
!       :        .                              .                                !
!       :        .                              .                                !
!       :        .                              .                                !
!       :        .                              .                                !
!       :        .                              .                                !
!       :        .                              .                                !
!       :        .                              .                                !
!       :        .                              .                                !
!                                                                                !
! O: C2 CH: -CE                                                                  !
--------------------------------------------------------------------------------
```

```
--------------------------------------------------------------------------------
!                                                            *PTJML.D474.CIV.2020!
! WORK AREAS..........ENTITY TYPE O DF0010 LIST OF NON-STANDARD CHANGES          !
!                                                                                !
! CODE FOR PLACEMENT..:      BA                                                  !
! A LIN T LEVEL OR SECTION WORK AREA DESCRIPTION                          OCCURS!
!   100 * LIST OF NON STANDARD CHANGES                                           !
!   110       EXEC PAF DECLARE CU01 CURSOR FOR                                   !
!   120       SELECT * FROM SCRDEF WHERE                                         !
!   130       ODELLB <> I-0020-ODELL1 OR                                         !
!   140       ODELIC <> I-0020-ODELI1 OR                                         !
!   150       OSCRHS <> I-0020-OSCRH1 OR                                         !
!   160       OSCRHE <> I-0020-OSCRH2 OR                                         !
!   170       END-EXEC                                                           !
!                                                                                !
!                                                                                !
!                                                                                !
!                                                                                !
!                                                                                !
!                                                                                !
!                                                                                !
!                                                                                !
!                                                                                !
!                                                                                !
! O: C1 CH: -W                                                                   !
--------------------------------------------------------------------------------
```

```
 --------------------------------------------------------------------------------
 !                                                           *PTJML.D474.CIV.2020!
 ! PROCEDURAL CODE       O DF0010 LIST OF NON-STANDARD CHANGES   FUNCTION: 02   !
 !                                                                              !
 ! A SF LIN OPE OPERANDS                        LVTY CONDITION                  !
 !          N   DAF INITIALIZATIONS             05IT EIBCALEN = 0               !
 !      100 EXP INIT                                                            !
 !      110 M   '0'     PF00-PFFRST                                             !
 ! - -- --- --- -------------------------------- ---- -------------------------!
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 ! O: C1 CH: -P02                                                               !
 !                                                                              !
 --------------------------------------------------------------------------------

 --------------------------------------------------------------------------------
 !                                                           *PTJML.D474.CIV.2020!
 ! PROCEDURAL CODE       O DF0010 LIST OF NON-STANDARD CHANGES   FUNCTION: 06   !
 !                                                                              !
 ! A SF LIN OPE OPERANDS                        LVTY CONDITION                  !
 !          N   DAF CONNECTION                  05IT PF00-PFFRST = '0'          !
 ! - -- --- --- -------------------------------- ---- -------------------------!
 !   BA     N   SET FIRST TIME INDICATOR        10BL                            !
 !   BA 100 M   '1'   PF00-PFFRST                                               !
 ! - -- --- --- -------------------------------- ---- -------------------------!
 !   CA     N   CURSOR CONNECTION               10BL                            !
 !   CA 100 EXP CONNECT CU01 TO                                                 !
 !   CA 110     USER    = 'USER'                                                !
 !   CA 120     PASS    = 'PASS'                                                !
 !   CA 130     LIB     = 'CIV'                                                 !
 !   CA 140     SESSION = SPACES                                                !
 !   CA 150     NET     = I-0010-PFVIEW                                         !
 !   CA 160     SIZE    = 10                                                    !
 !   CA 170     BASE    = 'D474'                                                !
 !   CA 180     IDENT   = EIBTRMID                                              !
 ! - -- --- --- -------------------------------- ---- --------------------------
 !   DA     N   OPEN CURSOR                     10BL                            !
 !   DA 100 EXP OPEN CU01                                                       !
 !                                                                              !
 ! O: C1 CH: -P06                                                               !
 !                                                                              !
 --------------------------------------------------------------------------------
 --------------------------------------------------------------------------------
 !                                                            PTJML.D474.CIV.2020!
 ! PROCEDURAL CODE       O DF0010 LIST OF NON-STANDARD CHANGES   FUNCTION: 06   !
 !                                                                              !
 ! A SF LIN OPE OPERANDS                         LVTY CONDITION                 !
 !   EA     N   SAVE CURSOR IN COMMAREA          10BL                           !
 !   EA 100 M   CU01-SAVE PF00-PFSAVE                                           !
 ! - -- --- --- -------------------------------- ---- --------------------------!
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 ! O: C1 CH: -P06ea                                                             !
 --------------------------------------------------------------------------------

 --------------------------------------------------------------------------------
 !                                                           *PTJML.D474.CIV.2020!
 ! PROCEDURAL CODE       O DF0010 LIST OF NON-STANDARD CHANGES   FUNCTION: 40   !
 !                                                                              !
 ! A SF LIN OPE OPERANDS                         LVTY CONDITION                 !
 !   31     N   END OF DAF PROCESSING            15BL                           !
 !   31 100 EXP CLOSE CU01                                                      !
 !   31 200 EXP QUIT                                                            !
 ! - -- --- --- -------------------------------- ---- --------------------------!
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 ! O: C1 CH: -P40                                                               !
 !                                                                              !
 --------------------------------------------------------------------------------
 --------------------------------------------------------------------------------
 !                                                            *PTJML.D474.CIV.2020!
 ! PROCEDURAL CODE       O DF0010 LIST OF NON-STANDARD CHANGES   FUNCTION: 52   !
 !                                                                              !
 ! A SF LIN OPE OPERANDS                         LVTY CONDITION                 !
 !          N   REINITIALIZATION OF DAF AREAS    05BL                           !
 !      100 M   DF00-PFSAVE CU01-SAVE                                           !
 ! - -- --- --- ------------------------------- ---- -------------------------!
 !   BA     N   CLOSE IF END OF CURSOR           10IT CU01-FT = '1'             !
 !   BA 100 EXP CLOSE CU01                                                      !
 ! - -- --- --- ------------------------------- ---- -------------------------!
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 ! O: C1 CH: -P52                                                               !
 !                                                                              !
 --------------------------------------------------------------------------------

 --------------------------------------------------------------------------------
 !                                                            *PTJML.D474.CIV.2020!
 ! PROCEDURAL CODE       O DF0010 LIST OF NON-STANDARD CHANGES   FUNCTION: 60   !
 !                                                                              !
 ! A SF LIN OPE OPERANDS                         LVTY CONDITION                 !
 !   PF     N   FETCH SCREEN DEFINITION RECORDS  10IT CU01-FT = '0'             !
 !   PF 100 EXP FETCH CU01                         AN CATX = 'R'                !
 ! - -- --- --- ------------------------------- ---- -------------------------!
 !   PQ     N   DISPLAY END OF LIST MESSAGE      10IT CU01-FT = '1'             !
 !   PQ 100 ERU 0001                                                            !
 !   PQ 200 GFT                                                                 !
 ! - -- --- --- ------------------------------- ---- -------------------------!
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 ! O: C1 CH: -P60                                                               !
 !                                                                              !
 --------------------------------------------------------------------------------
 --------------------------------------------------------------------------------
 !                                                         *PTJML.D474.CIV.2020!
 ! PROCEDURAL CODE       O DF0010 LIST OF NON-STANDARD CHANGES   FUNCTION: 75   !
 !                                                                              !
 ! A SF LIN OPE OPERANDS                        LVTY CONDITION                  !
 !          N   SAVE CURSOR IF NO ERROR          05IT GR-EG = '1'                !
 !      100 M   CU01-SAVE DF00-PFSAVE              AN CU01-FT = '0'              !
 ! - -- --- --- ------------------------------- ---- -------------------------!
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 ! *** END ***                                                                  !
 ! O: C1 CH: -P75                                                               !
 !                                                                              !
 --------------------------------------------------------------------------------

 --------------------------------------------------------------------------------
 !                        LIST OF NON-STANDARD CHANGES                          !
 !                                                                              !
 !                                                                              !
 !                                                                              !
 !             PLEASE ENTER THE STANDARD CHANGE CHARACTERISTICS:                !
 !                                                                              !
 ! LABEL TYPE........: S                 INIT. CHAR........: _                  !
 ! SCREEN HELP CHAR..: 11                FIELD HELP CHAR...: 12                 !
 --------------------------------------------------------------------------------
 !  SCREEN   SCREEN NAME                      LABEL   INIT   SCREEN   FIELD      !
 !  CODE                                      TYPE    CHAR   HELP     HELP       !
 !                                                           CHAR     CHAR       !
 !  XXXXXX   XXXXXXXXXXXXXXXXXXXXXXXXXXXXXX   X       X      XX       XX         !
 !  ......   ..............................   .       .      ..       ..         !
 !  ......   ..............................   .       .      ..       ..         !
 !  ......   ..............................   .       .      ..       ..         !
 !  ......   ..............................   .       .      ..       ..         !
 !  ......   ..............................   .       .      ..       ..         !
 !  ......   ..............................   .       .      ..       ..         !
 !  ......   ..............................   .       .      ..       ..         !
 !  ......   ..............................   .       .      ..       ..         !
 !  ......   ..............................   .       .      ..       ..         !
 ! XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX     !
 ! ENTER: DISPLAY, PF1: SCRLL,  PF2: EXIT, PF11: SCRN HELP,   PF12: FIELD HELP  !
 --------------------------------------------------------------------------------
```

```
--------------------------------------------------------------------------------
!                                                          *PTJML.D474.CIV.2020!
!                                                                              !
! DIALOGUE COMPLEMENT....................: DF                                  !
!                                                                              !
!                                                                              !
! COMMON AREA-DATA STRUCTURE CODE........:                                     !
!                                                                              !
! ERROR MESSAGE FILE CHARACTERISTICS.....:                                     !
!                       ORGANIZATION.....:                                     !
!                       EXTERNAL NAME....:                                     !
!                                                                              !
! FIRST SCREEN OF THE DIALOGUE...........:                                     !
!                                                                              !
! COMPLEMENTARY COMMON AREA LENGTH.......:                                     !
!                                                                              !
! CODE OF PSB OR SUB-SCHEMA..............:                                     !
!                                                                              !
!                                                                              !
! OPTIONS :                                                                    !
!                                                                              !
!                                                                              !
! SESSION NUMBER.....: 2013        LIBRARY......: CIV                          !
! *** END ***                                                                  !
! O: C1 CH: -O                          ACTION:                                !
--------------------------------------------------------------------------------
```

```
--------------------------------------------------------------------------------
!                                                          *PTJE.PDEV.T01.6080T!
! SEGMENT DESCRIPTION:     DF00 COMMUNICATION AREA                             !
!                                                                              !
! A NLG : CORUB  INT.FORM   U OCC GR I CMS456 CRNS VALUE/FCT UPD/TABL E DOC    !
!   100 : PFSAVE X(115)     D                                                  !
!   120 : PFFRST X          D                                                  !
!       :                                                                      !
!       :                                                                      !
!       :                                                                      !
!       :                                                                      !
!       :                                                                      !
!       :                                                                      !
!       :                                                                      !
!       :                                                                      !
!       :                                                                      !
!       :                                                                      !
!       :                                                                      !
!       :                                                                      !
!       :                                                                      !
!       :                                                                      !
!       :                                                                      !
!                                                                              !
! *** FIN ***                                                                  !
! O: C1 CH: SDF00CE                                                            !
!                                                                              !
--------------------------------------------------------------------------------
```

4. DAF IMPLEMENTATION FOR VARIOUS ENVIRONMENTS

4.1. MVS/CICS VERSION

DAF IMPLEMENTATION FOR MVS/CICS

There are two variants for this system:

. VS COBOL variant (A-mode 24)
. COBOL II variant (A-mode 31)

The user has to choose the appropriate variant based on his/her usual development environment.

For BATCH processing, and only for the VS COBOL (24-bit) variant), LSR VSAM buffer management can be used to optimize access. In this case, you have to include in the run JCL a one-line file (PACLSR) to parameterize physical access to the extractor

The following is the recommended way to code the parameters:

```
PACLSR DD *
10,,15,30
```

If you do not want to invoke the LSR routines, just code DUMMY on the PACLSR DD statement.

For ON-LINE processing, it is recommended that you use the EIBTRMID field to identify the users in CONNECT statements (IDENT parameter).

Furthermore, you can access several different databases from the same DAF program, in cases where several PACBASE databases coexist in the same region. The database calling code (4 characters), which is assigned to the BASE parameter in the CONNECT statement, makes it possible to select the database that you wish to query.

A typical CONNECT statement under CICS looks like this:

```
EXEC PAF CONNECT C001 TO
     USER = ZC00-CUSR
     PASS = ZC00-CPSW
     PRODUCT = ZC00-CPRO
     SUBSIDIARY = ZC00-CSUB
     SIZE = ZC00-LSCR
     IDENT = EIBTRMID
     BASE = ZC00-CBAS
```

4.2. CICS/DOS/VS VERSION

DAF IMPLEMENTATION FOR CICS/VSE

DAF implementation for CICS/VSE is currently being developed and will be included in the next DAF release.

4.3. IMS/VS/ESA VERSION

DAF IMPLEMENTATION FOR IMS/VS/ESA

All IMS DAF programs, whether batch or on-line, must always call the on-line extractor. (The IMS version doesn't include a batch extractor. It's the on-line extractor that's used in both batch and on-line processing.)

```
    - 'PBTPST' --> extractor for all entities except
      keywords.

    - 'PBTPWS' --> extractor for keyword entities only
      (from version 8.0.1 on).
```

The user must routinely code the 'SET' statement in the WORKING-STORAGE SECTION of batch programs, as well as on-line ones if they've been developed using Batch Language. This statement should be coded as follows:

```
           EXEC DAF SET TYPE = 01
           END-EXEC
```

In addition, the user has to define for his/her application program a PSB that is to include the following:

. it may include the PCBs of the user databases,

. it must include the PCBs of the DSMS system datasystem databases: AN, AR, AE and PA.

```
These PCBs can be listed in the PSB in any order, but they must be
defined as follows:                              .
                               .
                               .
     PCB  TYPE=DB,DBDNAME=PACDAN$SUF,PROCOPT=GOT,KEYLEN=43
     SENSEG  NAME=PAC7AN
     PCB  TYPE=DB,DBDNAME=PACDAR$SUF,PROCOPT=GOT,KEYLEN=07
     SENSEG  NAME=PAC7AR
     PCB  TYPE=DB,DBDNAME=PACDAE$SUF,PROCOPT=GOT,KEYLEN=12
     SENSEG  NAME=PAC7AE
     PCB  TYPE=DB,DBDNAME=PACDPA$SUF,PROCOPT=A,KEYLEN=37
     SENSEG  NAME=PAC7PA
                               .
                               .
                               .
```

where $SUF = the DBD suffix chosen when DSMS was installed.

Important note: Extractor call statements, which are generated by the preprocessor, have the following format:

```
CALL 'extractor' USING S-PCB-AN S-PCB-AR S-PCB-AE S-PCB-PA
                       cursor-name.
```

Therefore, you have to give the same names to PCBs in the LINKAGE SECTION and the PROCEDURE DIVISION USING in batch programs (S-PCB-xx). For dialog screens, the definition screens of the PCBs called in the dialog PSB must be named PCB-xx. The dialog generator will add the prefix 'S-' in the source generated on the LINKAGE SECTION and PROCEDURE DIVISION USING level.

<u>Doing Extractions under the Control of a Security System:</u>

Entities can be extracted under the control of a security system (e.g., RACF). In this case, the extractor must be able to tell whether the program doing the extraction is batch or on-line. The method for controling the user code is actually different for a batch or an on-line program.

In batch processing, the user code, given in the CONNECT statement, is directly controlled, in relation to the security system, by means of an assembler program, PACSECB, which is transparent to the user.

In on-line processing, the user code is controlled, in relation to the one listed in the IO-PCB, by the security system.

In order to achieve this control, the extractor must know the type of the program calling it (batch or on-line). To do this, the MODE parameter must be coded in the SET order:

```
   - MODE = 'TP   ' <- the user program is an on-line
                       program
   - MODE = 'BATCH' <- the user program is a batch program
```

Important note: For an on-line program, extractor call statements, which are generated by the preprocessor, will appear as follows:

```
CALL 'extractor' USING S-PCB-AN S-PCB-AR S-PCB-AE S-PCB-PA
                          cursor-name S-IPCB.
```

For batch programs, call orders are generated the same way, with or without the control of a security system (without the S-IPCB parameter in the CALL).

4.4. GCOS7 VERSION

<u>DAF IMPLEMENTATION FOR GCOS7</u>

DAF implementation for GCOS7 is currently being developed and will be included in the next DAF release.

4.5. GCOS8 VERSION

DAF IMPLEMENTATION FOR DPS8

DAF implementation for DPS8 is currently being developed and will be included in the next DAF release.

4.6. UNISYS 2200 VERSION

DAF IMPLEMENTATION FOR UNISYS 2200

DAF implementation for UNISYS 2200 is currently being developed and will be included in the next DAF release.

4.7. VISUALAGE PACBASE FOR UNIX, W/NT AND OS/2 VERSION

DAF IMPLEMENTATION FOR VISUALAGE PACBASE FOR UNIX, WINDOWS/NT AND OS2 VERSION

Components for implementation are:

. DAF preprocessor, DAF extractors, DAF Dictionary, program compilation and running scripts.

. The DAF10 program behaves as a preprocessor (refer to DPDF procedure in the DSMS 'Operations Manual').

. Two extraction sub-programs:
- PDSBDF for batch extractions
- PDSTDF for on-line extractions

Extractors compiled files are delivered in the directory of batch COBOL executables for DSMS.

Extractors COBOL source files are delivered in the DSMS 'dafcg' subdirectory. The subprograms must be compiled on the site when the Micro Focus compilator version of the site is different from the one used for DSMS.

DAF DICTIONARY

Data elements, Data Structure and Segment entities can be used to write programs calling DAF facility. These entities are delivered as batch transactions ('DAFDIC' file from the 'dafcbl' DSMS subdirectory).

The insertion of the 'DAF dictionary' in VisualAge Pacbase via the UPDT batch update procedure is under the responsaiability of the database manager.

COMPILING AND RUNNING DAF PROGRAMS

'dafcgi' directory under DSMS installation root contains an example of compilation and running scripts for a DAF program ('dafcomp' and 'dafrun').

It is advisable to duplicate the directory in a working directory, then to copy the DAF generated programs in this working directory.

Get into the working directory to modify and launch the compilation and running scripts.

The compilation script may be used to compile DAF subprograms.

5. ERROR MESSAGES

5.1. THE DAF TRANSLATOR

THE DAF TRANSLATOR

The DAF Translator can detect a number of syntax errors in SQL-PAF statements. Each error, including the corresponding error message and the line number which identifies the beginning of the DAF sequence in the translated program, is printed in an output report.

The possible error messages are listed below, including explanatory comments, in some cases.

UNKNOWN COLUMN CODE : <column-code>

> The <column-code> does not identify a table column specified in the FROM clause (in the selected language).

TOO MANY ELEMENTARY CONDITIONS IN SELECT CLAUSE

> There are more than 50 elementary conditions in this SQL-PAF query.

CURSOR CODE IS TOO LONG : <cursor-code>

> The cursor code must contain four characters.

CURSOR CODE ALREADY DECLARED : <cursor-code>

TOO MANY CURSORS DECLARED

> There are more than 100 cursors declared in this SQL-PAF query.

UNKNOWN CURSOR CODE : <cursor-code>

> There is a cursor management statement for a cursor which has not been declared in the DAF user program.

NO CONNECT STATEMENT FOR CURSOR: <cursor-code>

NO OPEN STATEMENT FOR CURSOR: <cursor-code>

NO FETCH STATEMENT FOR CURSOR: <cursor-code>

NO CLOSE STATEMENT FOR CURSOR: <cursor-code>

NO INIT STATEMENT FOR CURSOR: <cursor-code>

THE PAF SEQUENCE IS TOO LONG

A PAF sequence is a series of lines grouped between EXEC PAF and END-EXEC. The maximum number of these lines is 50.

END OF PROGRAM DURING A PAF SEQUENCE

OPERAND CANNOT BE NUMERIC: <operand>

OPERAND CANNOT BE ALPHANUMERIC: <operand>

INVALID OPERAND LENGTH: <operand>

Alphanumeric constant operands have a maximum length of 120 characters.

INVALID COBOL OPERAND: <operand>

COLUMN TYPES ARE DIFFERENT: <col1-code> <col2-code>

An elementary condition applies in the comparison of a numeric column with an alphanumeric column.

LEFT PARENTHESIS MISSING
RIGHT PARENTHESIS MISSING

Elementary conditions which follow the keyword WHERE must be enclosed between balanced parentheses, i.e., the number of LEFT parentheses must equal the number of RIGHT parentheses.

NO QUIT STATEMENT IN DAF-USER PROGRAM

SYNTAX ERROR: <erroneous-syntax>

Incorrect syntax for the SQL-PAF language.

INVALID LITERAL LENGTH: <literal>

The maximum length of a literal is 120 characters.

TOO MANY LITERALS ON A SINGLE LINE

The number of literals on a PAF sequence line must not exceed 40.

INCORRECT ENDING OF LITERAL: <literal>

UNKNOWN TABLE CODE: <table-code>

The <table-code> does not identify a DAF table (in the selected language).

INVALID STRING DELIMITER: <delimiter>

The delimiter specified in the SET statement must have a value of either SINGLE (single (') quotes) or DOUBLE (double (") quotes), respectively.

INVALID EXECUTION MODE: <execution-mode>

The execution mode specified in the SET statement must have a value of either BATCH or TP.

INVALID GENERATION VARIANT(S): <generation-variant(s)>

The generation variant(s) specified in the SET statement

ACCESS TO DAF IS NOT ALLOWED

Check the access key.

5.2. THE DAF EXTRACTOR

THE DAF EXTRACTOR

ERROR CODES RETURNED BY THE EXTRACTOR SUB-PROGRAM

The <cursor-code>-RETCOD field, generated by the DAF Translator, contains the error code returned by the DAF Extractor Sub-Program.

The '00' value in this field indicates that no error was detected.

There are three types of errors:

. SQL-PAF statement sequence errors,

. File access errors,

. Errors in extracted data.

SQL-PAF STATEMENT SEQUENCE ERRORS

Return Codes : 01 to 10

The following chart summarizes the errors which can occur in the sequence of SQL-PAF statements.

Statements on lines under (1) precede statements in columns under (2). "NULL" means that no prior statement has been issued.

When there is a sequence error, the corresponding box contains the return code value.

EXAMPLE: The first line indicates that no statement can be issued before the INIT statement.

(1) \ (2)	INIT	CONNECT	OPEN	FETCH	CLOSE	QUIT
NULL		01	01	01	01	01
INIT	02		03	04	05	
CONNECT	02			06	07	
OPEN	02		08			
FETCH	02		08			
CLOSE	02			09	10	
QUIT		01	01	01	01	01

RETURN CODE VALUES AND MEANING

01	Initializations not performed.	
02	Initializations already performed.	
03	OPEN	of an unconnected cursor.
04	FETCH	of an unconnected cursor.
05	CLOSE	of an unconnected cursor.
06	FETCH	of an unopened cursor.
07	CLOSE	of an unopened cursor.
08	OPEN	of an unclosed cursor.
09	FETCH	of a closed cursor.
10	CLOSE	of a closed cursor.

FILE ACCESS ERRORS

File access errors occur in relation to the DSMS database files (Index, Data, and Error Messages) and the Temporary Workfile.

RETURN CODE VALUES AND MEANING

21	Open error on Index File,
22	Open error on Data File,
23	Open error on Error Message File,
24	Open error on Intermediary Workfile,
31	Read/Write error on Intermediary Workfile,
32	Read error on DSMS file,
40	DSMS database Connection error.
41	Unauthorized use of DAF (access key).

ERRORS ON OUTPUTS

Return code: 50

Errors detected at the extraction are numerical errors for columns (defined with numerical format).