

GCSORT 1.03.10

[01 GEN 2015 Version]

User's Guide

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Sauro Menna
mennasauro@gmail.com

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*This work is dedicated to the memory of my niece Federica,
a strong young woman, sweet and resourceful.
You will always be in my heart and mind.*

Summary of Changes

Edition	Date	Change Description
1 st	15 Jan 2016	INITIAL RELEASE OF DOCUMENT
	09 Nov 2016	UPGRADE version with integration of LIBCOB New Data Types Search Substring search Conditional
1.0.1	15 Oct 2020	New option in command line -fsign=EBCDIC/ASCII for NUMERIC field.
1.0.1	09 Jan 2021	INREC OVERLAY – OUTREC OVERLAY
1.03.02	18 Jan 2022	RECORD CONTROL STATEMENT / DATE - Current Date : DATE1, DATE2, DATE3, DATE4 / INREC CHANGE / OUTREC CHANGE / MODS E15 – E35
1.03.03	27 Mar 2022	JOIN Statement
1.03.04	4 Agu 2022	FINDREP in INREC/OUTREC Control statement
1.03.05	13 Mar 2023	OUTFIL changes
1.03.06	29 Mar 2023	SubString new format type
1.03.07	12 Sep 2023	Test case EBCDIC
1.03.08	12 Oct 2023	New data type SFF (signed free form) and UFF (unsigned free form)
1.03.09	14 Nov 2023	Option XSUM and XSUM,FNAMES in SUM FIELD
1.04.00	27 Maj 2024	Collating Sequence in key definition (Index File) Multithread features to parallelize the execution of sort steps

Table of Contents

1.Introduction.....	6
1.1.What is GCSort?.....	6
2.Features	6
3.Environment and first use	13
3.1.Following the steps for the first use	13
3.2.Modify first environment variables	13
3.3.Use TAKE command	13
1.Process Schema	14
2.Sort	15
3.Merge	15
4.File Organization and Record Type	15
5.Field Type.....	16
5.1.Date Format.....	17
6.Commands.....	18
6.1.SORT	18
6.2.MERGE	18
6.3.COPY	18
6.4.FIELDS	18
6.5.USE.....	19
6.6.GIVE	20
6.7.INCLUDE/OMIT	20
6.8.INREC/OUTREC	23
6.9.SUM FIELDS.....	25
6.10.RECORD.....	26
6.11.OUTFIL	27
6.12.OPTION	27
6.13.EXIT ROUTINE	29
7.JOIN Statement.....	30
7.1.Join Schema	31
8.Environment Variables.....	35
8.1.Byte Order	35
8.2.Temporary Files	35
8.3.Memory Allocation	35
8.4.Statistics.....	36

9.Command Line.....	39
10.Padding and Truncating	39
11.Retun Code	39
12.File Conversion	40
13.Performance and Tuning	40
14.Limits	41
15.Errors and Warnings	41
16.GCSort by examples.....	42
16.1.SORT	42
16.2.MERGE	42
16.3.COPY	43
16.4.SUMFIELDS	43
16.5.OUTREC.....	44
16.6.OUTFIL	45
16.7.INREC/OUREC CHANGE	45
16.8.SFF/UFF Field Type.....	46
16.9.DATE.....	48
16.10.RECORD CONTROL STATEMENT	48
16.11.DATE – Option Y2PAST	48

1. Introduction

1.1.What is GCSort?

This document describes the features of the GCSORT utility.

GCSORT is an open-source tool for operations of sort/merge/copy files (Line Sequential, Sequential, Indexed and Relative) produced by GnuCobol compiler.

The principal developers of GCSORT are Cedric Issaly and Sauro Menna.

This document was intended to serve as a full-function reference and user's guide for GCSORT utility.

2. Features

Version 1.03.09 of GCSort contains a follow constructs:

<hr/>	
gcsort help	
gcsort is a utility to sort, merge, copy and join records in a file into a specified order in GnuCOBOL environment.	
<hr/>	
Syntax case insensitive	
Return code : 0 (ok) - 4 (warning) - 16 (error)	
<hr/>	
Usage with file parameters : gcsort <options> take filename	
Usage from command line : gcsort <options> <control statements>	
<hr/>	
gcsort options	
-fsign=[ASCII EBCDIC] define display sign representation	
-fcolseq=[NATIVE ASCII EBCDIC] collating sequence to use	
-febcdic-table=<cconv-table>/<file> EBCDIC/ASCII translation table	
<hr/>	
gcsort control statements	
Notations: '{name}' = parameters , ' ' = Alternative format of control statement	
=====	
Section for SORT, MERGE and COPY control statements	
=====	
SORT MERGE COPY FIELDS Control statement for Sort, Merge, Copy file(s)	
<hr/>	
USE	Declare input file(s)
GIVE	Declare output file
[SUM FIELDS]	Sum fields for same record key, or eliminate duplicate keys)
[RECORD]	Record control statement
[INCLUDE]	Select input records that respect include condition(s)
[OMIT]	Omit input records that respect omit condition(s)
[INREC]	Reformat input record Before sort, merge or copy operation
[OUTREC]	Reformat input record After sort, merge or copy operation
[OUTFIL]	Create one or more output files for sort,merge or copy operation
<hr/>	

[OPTION] Specifies option for control statements

gcsort

SORT | MERGE | COPY

FIELDS({Pos},{Len},{FormatType},{Order}, ...)

FIELDS({Pos},{Len},{Order}, ...),FORMAT={FormatType}

FIELDS=COPY

USE {Filename}

ORG {Org}

RECORD [F,{RecordLen}] | [V,{MinLen},{MaxLen}]

[KEY ({Pos},{Len},{KeyType}[,{Collating}]]]

GIVE same parameters of USE

SUM FIELDS = [({Pos},{Len},{FormatType2}, ...)]

[, XSUM] | [,XSUM,FNAMES=<file

path | environment variable>]

[({Pos},{Len}, ...)],FORMAT={FormatType2}

[, XSUM] | [,XSUM,FNAMES=<file

path | environment variable>]

[NONE] | [(NONE)] [,XSUM] | [,XSUM,FNAMES=<file path | environment

variable>]

XSUM without FNAMES file path generate file with same name of output file and with

' .xsum' extension

RECORD [TYPE=[{V} (Variable-length) / {F} (Fixed-length)]]

[,LENGTH=[{len} (L1-Input record

length)]

','[{len} (L2-Record

length)]

','[{len} (L3-Output

record length)]

INCLUDE | OMIT

COND=({Condition})[,FORMAT={FormatType}]

INREC FIELDS | INREC BUILD =({FieldSpec})

INREC OVERLAY =({FieldSpec})

OUTREC FIELDS | OUTREC BUILD =({FieldSpec})

OUTREC OVERLAY =({FieldSpec})

OUTFIL

INCLUDE | OMIT ({Condition})[,FORMAT={FormatType}]

OUTREC = ({FieldSpec})

FILES/FNAMES= {Filename} | (file1, file2, file3,...)

STARTREC={nn} Start from record nn

ENDREC={nn} Skip record after nn

SAVE

SPLIT Split 1 record output for file group (file1, file2, file3,...)

SPLITBY={nn} Split n records output for file group (file1, file2, file3,...)

OPTION

SKIPREC={nn} Skip nn records from input

STOPAFT={nn} Stop read after nn records

VLSCMP 0 disabled , 1 = enabled -- temporarily replace any
missing compare field bytes with binary zeros

VLSHRT 0 disabled , 1 = enabled -- treat any comparison
involving a short field as false

Y2PAST (YY) - Sliding, (YYYY) century

MODS E15=<name> [,] <name>= Name E15 Cobol Program for input
 E35=<name> <name>= Name E35 Cobol Program for ouput

INCLUDE | OMIT
 COND=({Condition})[,FORMAT={FormatType}]

INREC FIELDS =({FieldSpec}) | INREC BUILD =({FieldSpec})
 INREC OVERLAY =({FieldSpec}) | INREC FINDREP =({FindRepSpec})
 OUTREC FIELDS =({FieldSpec}) | OUTREC BUILD =({FieldSpec})
 OUTREC OVERLAY =({FieldSpec}) | OUTREC FINDREP =({FindRepSpec})

OUTFIL
 INCLUDE | OMIT ({Condition})[,FORMAT={FormatType}]
 OUTREC = ({FieldSpec})
 FILES/FNAMES= {Filename} | (file1, file2, file3,...)
 STARTREC={nn} Start from record nn
 ENDREC={nn} Skip record after nn
 SAVE
 SPLIT Split 1 record output for file group (file1, file2, file3,...)
 SPLITBY={nn} Split n records output for file group (file1, file2, file3,...)

OPTION
 SKIPREC={nn} Skip nn records from input
 STOPAFT={nn} Stop read after nn records
 VLSCMP 0 disabled , 1 = enabled -- temporarily replace any
 missing compare field bytes with binary zeros
 VLSHRT 0 disabled , 1 = enabled -- treat any comparison
 involving a short field as false

{Parameters}	{Relational}
{FileName} = Filename or Env. Variable	EQ = Equal
{Pos} = Field Position	GT = GreaterThan
{Len} = Field Length	GE = GreaterEqual
{RecordLen}= Record Length	LT = LesserThan
{MinLen} = Min size of record	LE = LesserEqual
{MaxLen} = Max size of record	NE = NotEqual
{Order} = A(ascending) D(descending)	SS = SubString (only for Field Type 'CH')

{Condition}
Format 1 - (Pos,Len,{FormatType},{Relational},{AND OR},Pos,Len,{FormatType})
Format 2 - (Pos,Len,{FormatType},{Relational},{X C'[value]'} numeric value)]
Format 3 - ({Condition} ,[AND OR},{Condition})
Format 4 - (Pos,Len,{FormatType},{Relational}, [DATE1][(+/-)num] [DATE2][(+/-)num] [DATE3][(+/-)num] [DATE4][(+/-)num] DATE - Currente Date : DATE1 (C'yyyymmdd'), DATE2 (C'yyyymm'), DATE3 (C'yyyddd'), DATE4 (C'yyyy-mm-dd') (no Timestamp) [(+/-)num] [+num] future date, [-num] past date) only for DATE1,DATE2,DATE3

{Org} File Organization	{KeyType} Mandatory for ORG = IX
LS = Line Sequential	P = Primary Key
SQ = Sequential Fixed or Variable	A = Alternative Key
IX = Indexed Fixed or Variable	AD = Alternative Key with Duplicates
RL = Relative Fixed or Variable	C = Continue definition
{Collating} Collating Sequence	
ASCII = Ascii sequence	

EBCDIC = EBCDIC sequence				
{FormatType} Field Format Type				{FormatType2} Format Type SumField
CH = Char				BI = Binary unsigned
BI = Binary unsigned				FI = Binary signed
FI = Binary signed				FL = Floating Point
FL = Floating Point				PD = Packed
PD = Packed				ZD = Zoned
ZD = Zoned				CLO = Numeric sign leading
CLO = Numeric sign leading				CSL = Numeric sign leading separate
CSL = Numeric sign leading separate				CST = Numeric sign trailing separate
CST = Numeric sign trailing separate				SS = Search Substring
Format Len Type Date field				Format Len Type Date field
Y2T = 8	ZD	CCYYMMDD		Y2D = 1 PD YY
Y2T = 4	ZD	YYXX		Y2P = 2 PD YY
Y2T = 2	ZD	YYX		Y2U = 3 PD YYDDD
Y2T = 3	ZD	YY		Y2S = 2 ZD YY
Y2T = 5	ZD	YYDDD		Y2V = 4 PD YYMMDD
Y2T = 6	ZD	YYMMDD		Y2X = 3 PD DDDYY
Y2B = 1	BI	YY		Y2Y = 4 PD MMDDYY
Y2C = 2	ZD	YY		Y2Z = 2 ZD YY
{FieldSpec} Field Specification				
pos, len		pos = position input record, len = length of field		
posOut:pos,len		posOut = position output, pos = position input , len = length		
n:X		Filling with Blank character from last position to n (absolute position of output record).		
n:Z		Filling with zero Binary character from last position to n (absolute position of output record).		
C'constant'		constant character value.		
nC'constant'		repeat n times constant character value.		
nX		repeat n times Blank character.		
nZ		repeat n times Binary (0x00) character.		
X'hh...hh'		hexdecimal characters.		
nX'hh...hh'		repeat n times hexadecimal characters.		
CHANGE=(vlen,[C X]'<valueFind>',[C X]'<valueSet>',...),NOMATCH=([C X]'<valueSet>)				
CHANGE=(vlen,[C X]'<valueFind>', posIn, lenIn), NOMATCH = (posIn, posLen)				
{FindRepSpec} Field Find/Replace Specification				
IN=C'constant' , OUT=C'constant'		constant character value.		
IN=(C'constant', C'constant') , OUT=C'constant'		constant character value.		
INOUT=(C'constantIn', C'constantOut' , C'constantIn', C'constantOut',)				
STARTPOS=pos		pos = Start Position to find/replace		
ENDPOS=pos		pos = End Position to find/replace		
DO=n		n=Maximum number of times find and replace		
MAXLEN=n		n=Maximum len of record n		
OVERRUN=TRUNC ERROR		Truncate or Error(Default) for overrun		
SHIFT=YES NO		Shift data or no (default) when different length between find replace		
Section for JOIN control statement				
JOIN file(s)				

```

USE                Declare input file F1
USE                Declare input file F2
GIVE               Declare output file
JOINKEYS FILES=F1.. Declare keys file F1
    [ INCLUDE]     Input file F1 - Select input records that respect include
condition(s)
    [ OMIT   ]     Input file F1 - Omit input records that respect omit condition(s)
JOINKEYS FILES=F2.. Declare keys file F2
    [ INCLUDE]     Input file F2 - Select input records that respect include
condition(s)
    [ OMIT   ]     Input file F2 - Omit input records that respect omit condition(s)
UNPAIRED           Declare join type
REFORMAT FIELDS    Declare output format
[ INCLUDE]         Output file - Select input records that respect include condition(s)
[ OMIT   ]         Output file - Omit input records that respect omit condition(s)
[ INREC   ]        Output file - Reformat input record before join operation
[ OUTFIL  ]        Output file - Create one or more output files from join operation

```

JOIN

```

USE {Filename}          [File F1]
ORG {Org}
RECORD [F,{RecordLen}] | [V,{MinLen},{MaxLen}]
                        [KEY ({Pos},{Len},{KeyType}[,{Collating}]]]

```

```

USE {Filename}          [File F2]
ORG {Org}
RECORD [F,{RecordLen}] | [V,{MinLen},{MaxLen}]
                        [KEY ({Pos},{Len},{KeyType}[,{Collating}]]]

```

GIVE same parameters of USE

```

JOINKEYS FILES=F1,FIELDS=[({Pos},{Len},{Order}, ...)]
                        [,SORTED] [,STOPAFT={nn}]
[, INCLUDE ] | [, OMIT]
                        [ COND=({Condition})[,FORMAT={FormatType}] ]

```

```

JOINKEYS FILES=F2,FIELDS=[({Pos},{Len},{Order}, ...)]
                        [,SORTED] [,STOPAFT={nn}]
[, INCLUDE ] | [, OMIT]
                        [ COND=({Condition})[,FORMAT={FormatType}] ]

```

JOIN UNPAIRED [,F1][,F2][,ONLY]

UNPAIRED,F1,F2 or UNPAIRED

Unpaired records from F1 and F2 as well as paired records (Full outer join).

UNPAIRED,F1

Unpaired records from F1 as well as paired records (Left outer join).

UNPAIRED,F2

Unpaired records from F2 as well as paired records (Right outer join).

UNPAIRED,F1,F2,ONLY or UNPAIRED,ONLY

Unpaired records from F1 and F2.

UNPAIRED,F1,ONLY

Unpaired records from F1.

UNPAIRED,F2,ONLY

Unpaired records from F2.

```

REFORMAT FIELDS=({File}:{Pos},{Len},{?},{File}:{Pos},{Len}....) [,FILL=[C'constant']
| [X'hh']

```

Commands for output file

```

INCLUDE | OMIT
COND=({Condition})[,FORMAT={FormatType}]

```

```

INREC FIELDS | INREC BUILD =({FieldSpec})
INREC OVERLAY =({FieldSpec})
OUTREC FIELDS | OUTREC BUILD =({FieldSpec})
OUTREC OVERLAY =({FieldSpec})

```

OUTFIL

```

INCLUDE | OMIT ({Condition})[,FORMAT={FormatType}]
OUTREC BUILD | BUILD = ({FieldSpec})
FILES/FNAMES= {Filename}

```

{Parameters}	{Parameters}
{File} = F1 or F2	? = 1-byte indicator joined record
{Pos} = Field Position	'B' = 'Both' - Key found in F1 and F2
{Len} = Field Length	'1' = Key found in F1, but not in F2
{Order} = A(ascending) D(descending)	'2' = Key found in F1, but not in F1
C'Constant' = Character fill byte	nn = Numbers of records from input file
X'hh' = Hexadecimal fill byte (00-FF).	

{Parameters}	{Relational}
{FileName} = Filename or Env. Variable	EQ = Equal
{Pos} = Field Position	GT = GreaterThan
{Len} = Field Length	GE = GreaterEqual
{RecordLen} = Record Length	LT = LesserThan
{MinLen} = Min size of record	LE = LesserEqual
{MaxLen} = Max size of record	NE = NotEqual
{Order} = A(ascending) D(descending)	SS = SubString (only for Field Type 'CH')

{Condition}
Format 1 - (Pos,Len,{FormatType},{Relational},[AND OR],Pos,Len,{FormatType})
Format 2 - (Pos,Len,{FormatType},{Relational},[X C'[value]'] numeric value)]
Format 3 - ({Condition} ,[AND OR],{Condition})
Format 4 - (Pos,Len,{FormatType},{Relational}, [DATE1][(+/-)num] [DATE2][(+/-)num] [DATE3][(+/-)num] [DATE4][(+/-)num]
DATE - Current Date : DATE1 (C'yyyymmdd'), DATE2 (C'yyyymm'), DATE3 (C'yyyddd'), DATE4 (C'yyyy-mm-dd') (no Timestamp)
[(+/-)num] [+num] future date, [-num] past date) only for DATE1,DATE2,DATE3

{Org} File Organization	{KeyType} Mandatory for ORG = IX
LS = Line Sequential	P = Primary Key
SQ = Sequential Fixed or Variable	A = Alternative Key
IX = Indexed Fixed or Variable	AD = Alternative Key with Duplicates
RL = Relative Fixed or Variable	C = Continue definition

{Collating} Collating Sequence
ASCII = Ascii sequence
EBCDIC = EBCDIC sequence

{FormatType} Field Format Type	{FormatType2} Format Type SumField
CH = Char	BI = Binary unsigned

BI = Binary unsigned	FI = Binary signed
FI = Binary signed	FL = Floating Point
FL = Floating Point	PD = Packed
PD = Packed	ZD = Zoned
ZD = Zoned	CLO = Numeric sign leading
CLO = Numeric sign leading	CSL = Numeric sign leading separate
CSL = Numeric sign leading separate	CST = Numeric sign trailing separate
CST = Numeric sign trailing separate	SS = Search Substring

Format	Len	Type	Date field	Format	Len	Type	Date field
Y2T	= 8	ZD	CCYYMMDD	Y2D	= 1	PD	YY
Y2T	= 4	ZD	YYXX	Y2P	= 2	PD	YY
Y2T	= 2	ZD	YYX	Y2U	= 3	PD	YYDDD
Y2T	= 3	ZD	YY	Y2S	= 2	ZD	YY
Y2T	= 5	ZD	YYDDD	Y2V	= 4	PD	YYMMDD
Y2T	= 6	ZD	YYMMDD	Y2X	= 3	PD	DDDDYY
Y2B	= 1	BI	YY	Y2Y	= 4	PD	MMDDYY
Y2C	= 2	ZD	YY	Y2Z	= 2	ZD	YY

{FieldSpec}	Field Specification
pos, len	pos = position input record, len = length of field
posOut:pos,len	posOut = position output, pos = position input , len = length
n:X	Filling with Blank character from last position to n (absolute position of output record).
n:Z	Filling with zero Binary character from last position to n (absolute position of output record).
C'constant'	constant character value.
nC'constant'	repeat n times constant character value.
nX	repeat n times Blank character.
nZ	repeat n times Binary (0x00) character.
X'hh...hh'	hexadecimal characters.
nX'hh...hh'	repeat n times hexadecimal characters.
CHANGE=(vlen,[C X]'<valueFind>',[C X]'<valueSet>',...),NOMATCH=([C X]'<valueSet>)	
CHANGE=(vlen,[C X]'<valueFind>', posIn, lenIn), NOMATCH = (posIn, posLen)	

Environment Variables

COB_VARSEQ_FORMAT	Used by GnuCOBOL
GCSORT_DEBUG	0 no print info, 1 info DEBUG, 2 for info Parser
GCSORT_MEMSIZE	Memory Allocation in byte (Default 512000000 byte)
GCSORT_PATHTMP	Pathname for temporary files (Default TMP / TEMP / TMPDIR)
GCSORT_STATISTICS	0 minimal informations, 1 for Summary, 2 for Details
GCSORT_TESTCMD	0 for normal operations , 1 for ONLY test command line (NO SORT)

3. Environment and first use

GCSort is a executable program written in 'C'.

Dependencies of executable GCSort are:

- **libcob** - GNUCobol
- **libm** - Math library

3.1. Following the steps for the first use

- Make executable gcsort
- Set environment variable to find library at runtime
- Run *gcsort* <option> <command line>
 - o <option>
 - -fsign=[EBCDIC | ASCII]
 - -fcolseq=[NATIVE|ASCII|EBCDIC]
 - -febcdic-table=<cconv-table>/<file>

The *-fsign=EBCDIC* option can be used for files with ZONED fields and EBCDIC sign.

The *-fcolseq* parameter collating sequence to use.

The *-febcdic-table* parameter EBCDIC/ASCII translation table

3.2. Modify first environment variables

- Set Memory Allocation (GCSORT_MEMSIZE)
- Set Statistics (GCSORT_STATISTICS) to view details of execution

3.3. Use TAKE command

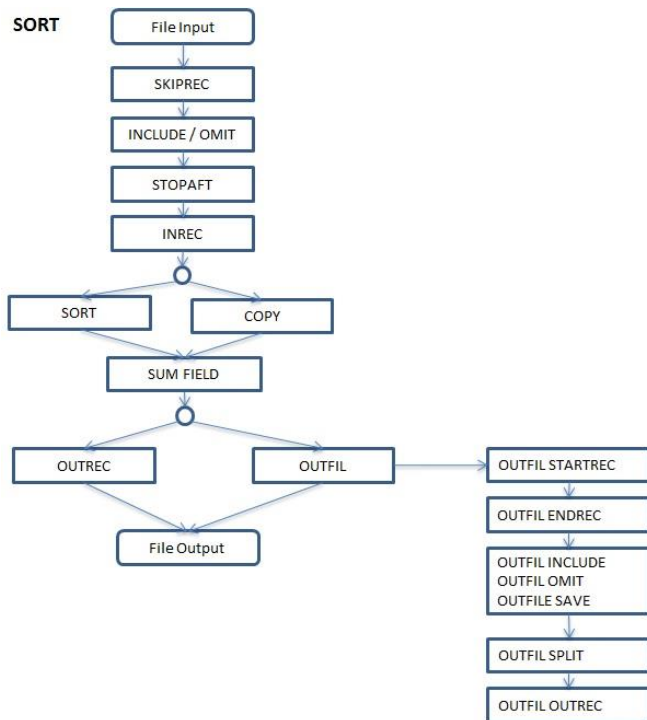
- Create file text
- Insert command. Single row o one row for command.
- In the file TAKE the '*' character indicates that the rest of the line is treated as a comment
- Run : *gcsort TAKE filename*

Example to create TAKE file with script sh.

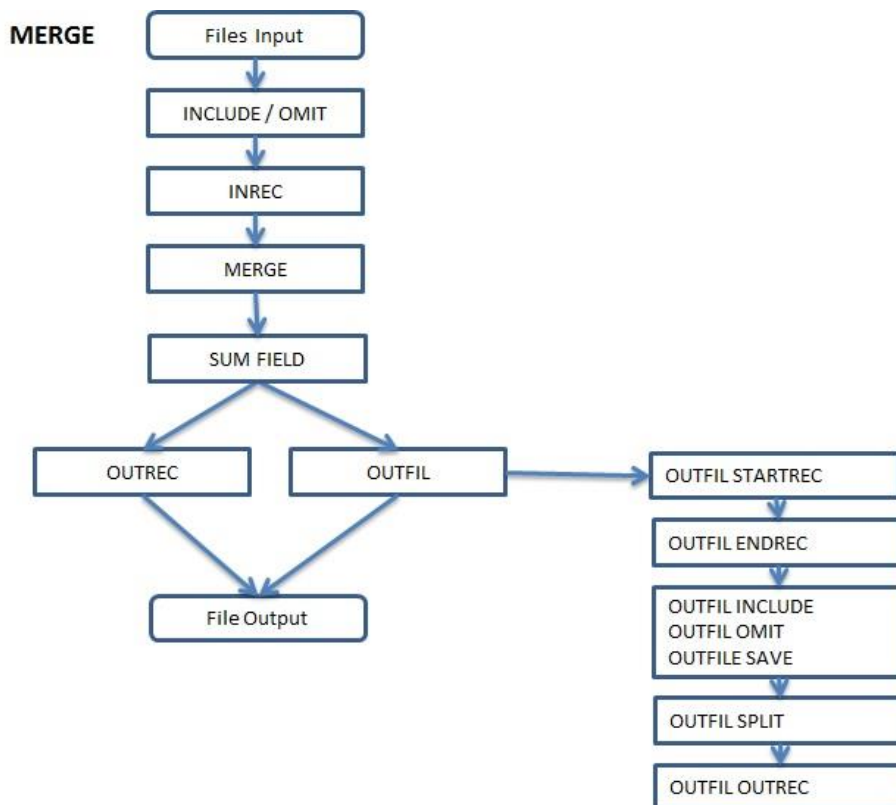
```
export LD_LIBRARY_PATH=/usr/local/lib
export GCSORT_MEMSIZE=1024000000
export GCSORT_BYTEORDER=0
export GCSORT_STATISTICS=2
echo "      * This is comment "                >TAKEFILE.PRM
echo "SORT  FIELDS(4,1,CH,A) "                  >TAKEFILE.PRM
echo "SUM   FIELDS=(1,2,ZD,4,2,ZD,7,4,ZD,12,4,ZD)  " >>TAKEFILE.PRM
echo "USE   ../files/SQZD03 RECORD F,396 ORG SQ    " >>TAKEFILE.PRM
echo "GIVE  ../files/SQZD03.SRT RECORD F,396 ORG SQ " >>TAKEFILE.PRM
../bin/gcsort TAKE TAKEFILE.PRM
```

1. Process Schema

This picture show logical schema of utility GCSort for SORT operations.



This picture show logical schema of utility GCSort for MERGE operations.



2. Sort

The purpose of SORT is read one or more files and create a output file with data ordered as indicated by the sort key fields.

3. Merge

The purpose of MERGE is read one or more files and create a output file with data ordered as indicated by the merge key fields.

It is mandatory that the input data is already sorted.

4. File Organization and Record Type

File organization identifies the type of file.

The types of file organization utility managed GCSORT are:

- LS** = Line Sequential
- LSF** = Line Sequential Fixed
- SQ** = Sequential
- IX** = Indexed
- RL** = Relative

Use LSF file organization when the record to be sorted contains trailing spaces and you need fixed-length records (GCSort does not delete trailing spaces). Record type identifies the record structure

Record type are

F = Fixed

V = Variable (first n byte record len, verify COB_VARSEQ_FORMAT in GNUCobol)

5. Field Type

Field type detects typology of field, Field type used are:

Type	Description
PD	Packed
ZD	Zoned
CLO	Numeric sign leading
CSL	Numeric sign leading separate
CST	Numeric sign trailing separate
BI	Binary unsigned
FI	Binary signed
FL	Floating Point
PD	Packed
ZD	Zoned
CLO	Numeric sign leading
CSL	Numeric sign leading separate
CST	Numeric sign trailing separate
SS	Search Substring
SFF	Signed free form
UFF	unsigned free form

5.1. Date Format

Field Formats and Lengths for date.

Format	Len	Type	Date field	Format	Len	Type	Date field
Y2T = 8	ZD		CCYYMMDD	Y2D = 1	PD		YY
Y2T = 4	ZD		YYXX	Y2P = 2	PD		YY
Y2T = 2	ZD		YYX	Y2U = 3	PD		YYDDD
Y2T = 3	ZD		YY	Y2S = 2	ZD		YY
Y2T = 5	ZD		YYDDD	Y2V = 4	PD		YYMMDD
Y2T = 6	ZD		YYMMDD	Y2X = 3	PD		DDDDYY
Y2B = 1	BI		YY	Y2Y = 4	PD		MMDDYY
Y2C = 2	ZD		YY	Y2Z = 2	ZD		YY

[DATE - Current Date : DATE4]

```
INCLUDE COND=(1,13,CH,GT,DATE4)
```

```
USE ../files/inp5000.txt ORG LS RECORD F,5000
```

```
GIVE ../files/inp5000.txt.srt ORG LS RECORD F,5000
```

```
SORT FIELDS=(35,5,ZD,A)
```

[DATE + / - day - month]

```
COND=(1,13,CH,GT,DATE1+5)
```

```
COND=(1,13,CH,GT,DATE1-5)
```

```
COND=(1,13,CH,GT,DATE2+3)
```

```
COND=(1,13,CH,GT,DATE2-8)
```

```
COND=(1,13,CH,GT,DATE3+150)
```

```
COND=(1,13,CH,GT,DATE3-15)
```

[DATE4]

```
OMIT COND=(1,13,CH,GT,DATE4)
```

6. Commands

6.1. SORT

SORT is command for ordering data.

Format 1 **SORT**

6.2. MERGE

MERGE is command for merging data.

Format 1 **MERGE**

6.3. COPY

In SORT or MERGE command **FIELDS=COPY** copy data from input to output file.

Format 1 **FIELDS=COPY**

6.4. FIELDS

This command specify fields for sort/merge operations. The fields are the key for order or merging data from files.

Format 1 FIELDS (pos,len,type,order, ...) |
Format 2 FIELDS ((pos,len, order, ...),FORMAT=TYPE |
Format 3 FIELDS=COPY

FIELDS (pos, len, type, order,...)

pos specifies the first byte of a control field relative to the beginning of the input record.

The first data byte of a fixed-length record has relative position 1.

The first data byte of a variable-length record has relative position 1.

len specifies the length of the field. Values for all fields must be expressed in integer numbers of bytes.

type specifies the format of the data of field.

Type	Description
CH	Char
BI	Binary unsigned
FI	Binary signed
FL	Floating Point
PD	Packed
ZD	Zoned

CLO	Numeric sign leading
CSL	Numeric sign leading separate
CST	Numeric sign trailing separate
SS	Search Substring

order specifies how the field is to be ordered. The valid codes are:

A ascending order

D descending order

FIELDS ((pos,len,order, ...),FORMAT=type

FORMAT=type can be used to specify a particular format for one or more control fields. f from FORMAT=f is used for p,m,s fields.

FIELDS=COPY or FIELDS=(COPY)

Causes GCSORT to copy a file input to the output data sets. Records can be edited INCLUDE/OMIT, INREC, OUTREC, and OUTFIL statements; and SKIPREC and STOPAFT parameters.

6.5. USE

USE command declare input file for SORT and MERGE operation.

Format for USE:

USE <filename > ORG <organization> RECORD [<record format>,< length>]
[KEY ({Pos},{Len},{KeyType},{Collating}})]

USE <filename > ORG <organization> RECORD [<record format>,<lenght min>,< length max>]
[KEY ({Pos},{Len},{KeyType},{Collating}})]

filename Input file name, with or without pathname

organization **LS** = Line Sequential

SQ = Sequential

RL = Relative

IX = Indexed

record format **F** = Fixed

V = Variable

length Length of record

length min Minimum length of record

length max Maximum length of record

Structure of key (Mandatory for ORG = IX)

Pos	Position of key
Len	Length of key
KeyType	P = Primary Key A = Alternative Key AD = Alternative Key with Duplicates C = Continue definition
Collating	ASCII = Collating sequence ASCII EBCDIC = Collating sequence EBCDIC

6.6. GIVE

GIVE command declare output file for SORT and MERGE operation.

Same rules of USE control statement.

Format for GIVE:

```
GIVE <filename> ORG <organization> RECORD [<record format>,< length>]
      [KEY ({Pos},{Len},{KeyType},{Collating})]
```

```
GIVE <filename> ORG <organization> RECORD [<record format>,<length min>,< length max>]
      [KEY ({Pos},{Len},{KeyType},{Collating})]
```

6.7. INCLUDE/OMIT

INCLUDE condition statement is used for **select** records to insert in the file output.

OMIT condition statement is used for **exclude** certain records from the file input.

INCLUDE/OMIT COND=(condition) [FORMAT=type]

condition

Format 1	(pos , len , type , cond, pos , len , type)
Format 2	(pos , len , type , cond, [X C Z]'[value]')
Format 3	(condition , relcond , condition)

Format 1 (pos , len , type , cond, relcond , pos , len , type)

pos	specifies the first byte of a control field relative to the beginning of the input record. The first data byte of a fixed-length record has relative position 1. The first data byte of a variable-length record has relative position 1.
len	specifies the length of the field. Values for all fields must be expressed in integer numbers of bytes.
type	specifies the format of the data of field.

Type	Description
------	-------------

CH	Char
BI	Binary unsigned
FI	Binary signed
FL	Floating Point
PD	Packed
ZD	Zoned
CLO	Numeric sign leading
CSL	Numeric sign leading separate
CST	Numeric sign trailing separate
SS	Search Substring

cond Comparison operators are as follows:

- EQ** Equal to
- NE** Not equal to
- GT** Greater than
- GE** Greater than or equal to
- LT** Less than
- LE** Less than or equal to
- SS** Search Substring

With the SearchSubstring option, you can search for substrings within a field. The length can be greater than the length of the substring. It is possible to search for multiple substrings within the field.

Examples:

INCLUDE COND=(1,100,SS,EQ,C'66666')

INCLUDE FORMAT=SS,COND=(18,2,EQ,C'00,88,99')

***Format 2** (pos , len , type , cond, [X|C]'[value]')[+/-nnnn]*

pos specifies the first byte of a control field relative to the beginning of the input record.

The first data byte of a fixed-length record has relative position 1.

The first data byte of a variable-length record has relative position 1.

len specifies the length of the field. Values for all fields must be expressed in integer numbers of bytes.

type specifies the format of the data of field.

Type	Description
CH	Char
BI	Binary unsigned
FI	Binary signed
FL	Floating Point
PD	Packed
ZD	Zoned
CLO	Numeric sign leading
CSL	Numeric sign leading separate
CST	Numeric sign trailing separate

SS	Search Substring
-----------	------------------

cond Comparison operators are as follows:

EQ Equal to
 NE Not equal to
 GT Greater than
 GE Greater than or equal to
 LT Less than
 LE Less than or equal to

C'cc...c' **Character String Format** . The value c is a ASCII character/string.

X'hh..hh' **Hexadecimal String Format**. The value hh represents any pair of hexadecimal digits.

+/- nnnn.. **Decimal Number Format**

Format 3 (*condition , relcond , condition*)

condition Format 1 or Format 2

relcond Relational conditions can be logically combined, with AND or OR.
 The relational condition specifies that a comparison test be performed.
 Relational conditions can be logically combined, with AND or OR.

Format 4 (*pos, len , CHANGE=(vlen, [X|C]'[value Find]', [X|C]'[value Set]'*
NOMATCH=([X|C]'[value]'))

CHANGE Specifies how the input field or parsed input field is to be changed to the output field, using a lookup table.

NOMATCH if an input field value does not match any of the find constants, **NOMATCH** values is used for output field.

Format 5 (*pos, len , CHANGE=(vlen, [X|C]'[value Find]', posFind, lenFind*
NOMATCH=(posNoMatch, lenNomatch))

CHANGE Specifies how the input field or parsed input field is to be changed to the output field, using position(*posFind*) and length(*lenFind*) of input record.

NOMATCH if an input field value does not match any of the find constants, **NOMATCH** input record *position* and *length* are used for output field.

6.8. INREC/OUTREC

INREC redefines the structure of record input. This operation is executed after read file input e before all operations.

The **INREC** control statement reformat the input records **before** they are sorted, merged, or copied. All fields specifications presents in **OUTREC**, **Sort Key**, ... must be referred to a new structure defined by **INREC**.

Format 1 INREC **FIELDS**=(FIELD-SPEC...)
Format 2 INREC **BUILD**=(FIELD-SPEC...)
Format 3 INREC **OVERLAY**=(FIELD-SPEC...)
Format 4 INREC **FINDREP**=(FIELD-FINDEREP-SPEC

OUTREC defines structure record output for output file.

Format 1 OUTREC **FIELDS**=(FIELD-SPEC...)
Format 2 OUTREC **BUILD**=(FIELD-SPEC...)
Format 3 OUTREC **OVERLAY**=(FIELD-SPEC...)
Format 4 INREC **FINDREP**=(FIELD-FINDEREP-SPEC

Use **OVERALY** only to overwrite existing columns or to add fields at end of every record.

Field specification is the same for **INREC** and **OUTREC**.

BUILD or **FIELDS** are synonymous.

FIELD-SPEC (**pos, len** | **posOut:pos,len** | **n:X** | **n:Z** | **nC'constant'** | **nX** | **nZ**, |**X'hh'**)

One or more occurrence of follow elements, separated by comma.

pos, len	pos = position input record, len = length of field
posOut:pos,len	posOut = position output, pos = position input record, len = length of field
n:X	Filling with Blank character (0x20) from last position to n (absolute position of output record).
n:Z	Filling with zero Binary (0x00) character from last position to n (absolute position of output record).
C'constant'	constant character value.
nC'constant'	repeat n times constant character value.
nX	repeat n times Blank character.
nZ	repeat n times Binary (0x00) character.
X'hh...hh'	hexadecimal string .
nX'hh...hh'	repeat n times hexadecimal string .

FIELD-FINDREP-SPEC__Field Find/Replace Specification

IN=C'constant' , OUT=C'constant'	constant character value.
IN=(C'constant', C'constant') , OUT=C'constant'	constant character value.
INOUT=(C'constantIn', C'constantOut' , C'constantIn', C'constantOut',)	
STARTPOS=pos	pos = Start Position to find/replace
ENDPOS=pos	pos = End Position to find/replace
DO=n	n=Maximum number of times find and replace
MAXLEN=n	n=Maximum len of record n
OVERRUN=TRUNC ERROR Truncate or Error(Default) for overrun	
SHIFT=YES NO	Shift data or no (default) when different length between find replace

6.9. SUM FIELDS

SUM FIELDS is command for aggregate record and summarize value for numeric fields.
All fields present in SUM FIELDS are aggregate when more records has same key.

Format 1 SUM FIELDS = (pos,len,type, ...)

Format 2 SUM FIELDS = (NONE) or SUM FIELDS = NONE

There are two formats for SUM FIELD, the first summarize numeric fields, the send NOT summarize, but eliminate duplicate key.

Format 1 SUM FIELDS = (pos,len,type, ...)

pos specifies the first byte of a control field relative to the beginning of the input record.

The first data byte of a fixed-length record has relative position 1.

The first data byte of a variable-length record has relative position 1.

len specifies the length of the field. Values for all fields must be expressed in integer numbers of bytes.

type specifies the format of the data of field.

Type	Description
BI	Binary unsigned
FI	Binary signed
FL	Floating Point
PD	Packed
ZD	Zoned
CLO	Numeric sign leading
CSL	Numeric sign leading separate
CST	Numeric sign trailing separate

Format 2 SUM FIELDS = (NONE) or SUM FIELDS = NONE

In this case Format2 insert into output file one occurrence of same key specified by SORT KEY.

The record output contains the first record in order of reading.

For identify a first occurrence of data, GCSORT verified the value of pointer of record into file input, selecting the lowest value.

Format 3 SUM FIELDS = NONE, XSUM

The Format3 produces a separate file with the records discarded by SUM FIELD. The file name is identical to the output file with '.xsum' suffix.

Format 4 **SUM FIELDS = NONE, XSUM** **,FNAMES=<file path/Environment variable >**

The Format4 produces a separate file with the records discarded by SUM FIELD using value presents in FNAMES definition.

If FNAMES is a file name, the records output are stored the output file.

If FNAMES is an environment variable GCSORT use definition to store discarded record from SUM FIELD.

6.10. RECORD

RECORD control statement is option to specify the type and lengths of the records.

RECORD [TYPE=[{V}/{F}{Fixed-length}]] , [LENGTH=[{len}{L1-Input record length}]
'[{len}{L2-Record length}]
'[{len}{L3-Output record length}]

TYPE = V (Variable-length) / F (Fixed-length)

LENGTH = (L1, L2, L3)

L1 = Input length

L2 = Record length after E15

L3 = Output record length

L1 is ignored if the input record length is available from USE command.

L2 is ignored if E15 is not used.

L3 is ignored if the input record length is available from GIVE command.

Example:

[RECORD CONTROL STATEMENT]

```
SORT FIELDS=(8,5,CH,A) USE ../files/sqbig01.dat  ORG SQ GIVE ../files/sqbig01_gcs.srt  ORG SQ RECORD TYPE=F, LENGTH=500

RECORD TYPE=F, LENGTH=(500)

RECORD TYPE=F, LENGTH=(500, ,500)

RECORD TYPE=F LENGTH=(, ,500)

RECORD TYPE=F,LENGTH=(, ,500)
```

6.11. OUTFIL

OUTFIL is command to create one or more output file for a sort, copy, or merge operation.
Each file output is defined from OUTFIL command

FORMAT

OUTFIL

FILES/FNAMES= (environment variable)
STARTREC=nn
ENDREC=nn
[SAVE|[INCLUDE|OMIT] (CONDITION) [FORMAT=TYPE]]
SPLIT
OUTREC = (FIELD-SPEC...)

OUTFIL

FILES/FNAMES=filename	filename = Identify a environment variable the contain the file name
STARTREC=nn	Start write after nn records
ENDREC=nn	Stop write after nn records
SAVE	Save records that not used by command INCLUDE/OMIT.
INCLUDE/OMIT (CONDITION) [FORMAT=TYPE]]	Same definition for COND-FIELD (INCLUDE/OMIT)
SPLIT	Split 1 record for each File in Group definition (FILE=file1,file,file2)
SPLITBY=n	Split n records for each File in Group definition (FILE=file1,file,file2)
OUTREC = (FIELD-SPEC...)	Define structure output data. Same definition for (FIELD-SPEC...).

If the environment variable filename for FILES/FNAMES is not defined, GCSort writes output file in local folder assuming the name equal at value of identifier filename (FILES/FNAMES=*filename*).

If OUTFIL does not include the definition of FNAMES/FILES the input data will be written to the GIVE file.

6.12. OPTION

This command allows you to change the behavior of the utility.

Format1 **OPTION** [SKIPREC=nn] [[STOPAFT=nn] [[VLSCMP]] [VLSHRT] | [Y2PAST=[YY] | [YYYY]]

SKIPREC=nn	Skip nn records from input
STOPAFT=nn	Stop read after nn records
VLSCMP	0 disabled , 1 = enabled -- temporarily replace any missing compare field bytes with binary zeros
VLSHRT	0 disabled , 1 = enabled -- treat any comparison involving a short field as false
Y2PAST=YY	(YY) – Sliding = Numbers of years to subtract from the current year.
	(YYYY) – Century= Specifies the beginning of the fixed century window.

MODS [E15 =(<name>)] [E35=(<name>)] Routine name E15 and/or E35 Cobol Program.

6.13. EXIT ROUTINE

E15 – Routine called after file read

E15 routine is a COBOL program.

Linkage :

```
LINKAGE      for fixed records
01  RECORD - FLAGS          PIC 9(8) BINARY.
    88  FIRST - REC          VALUE 00.
    88  MIDDLE - REC         VALUE 04.
    88  END - REC            VALUE 08.
01  NEW-REC                 PIC X(nn).
01  RETURN-REC              PIC X(nn).
01  UNUSED1                 PIC 9(8) BINARY.
01  UNUSED2                 PIC 9(8) BINARY.
01  NEW-REC-LEN             PIC 9(8) BINARY
(Only for Variable Length)
01  RETURN-REC-LEN          PIC 9(8) BINARY                      (Only
for Variable Length)
01  UNUSED5                 PIC 9(8) BINARY.
01  EXITAREA-LEN            PIC 9(4) BINARY.
01  EXITAREA.
    05  EAREA OCCURS 1 TO 256 TIMES
        DEPENDING ON EXITAREA-LEN  PIC X.
```

E35 – Routine called before write output

E35 routine is a COBOL program.

```
LINKAGE      for fixed records
01  RECORD-FLAGS          PIC 9(8) BINARY.
    88  FIRST-REC          VALUE 00.
    88  MIDDLE-REC         VALUE 04.
    88  END-REC            VALUE 08.
01  LEAVING-REC.
    05  LREC OCCURS 1 TO 200 TIMES
        DEPENDING ON LEAVING-REC-LEN  PIC X.
01  RETURN-REC.
    05  RREC OCCURS 1 TO 200 TIMES
        DEPENDING ON RETURN-REC-LEN  PIC X.
01  OUTPUT-REC.
    05  OREC OCCURS 1 TO 200 TIMES
        DEPENDING ON OUTPUT-REC-LEN  PIC X.
01  UNUSED1                 PIC 9(8) BINARY.
01  LEAVING-REC-LEN         PIC 9(8) BINARY.
01  RETURN-REC-LEN         PIC 9(8) BINARY.
01  OUTPUT-REC-LEN         PIC 9(8) BINARY.
01  EXITAREA-LEN           PIC 9(4) BINARY.
01  EXITAREA.
```

05 EAREA OCCURS 1 TO 256 TIMES
DEPENDING ON EXITAREA-LEN PIC X.

E15 - Return code

00 - No Action
04 - Record deleted
08 - Do Not Return
12 - Record inserted
16 - Terminate DFSORT
20 – Record Altered or Replaced

E35 – Return code

00 - No Action
04 – Record deleted
08 - Do Not Return
12 - Insert record
16 - End of GCSort

7. JOIN Statement

The purpose of the JOIN statement is to perform JOIN between two files (F1 and F2). You can perform different types of join on two files (F1 and F2) by one or more keys with GCSort using the following statements:

JOINKEYS

JOINKEYS specifies the definition of the JOIN key.

It is necessary to specify a JOINKEYS statement for each file, one for F1 and one for F2.

Each JOINKEYS statement must specify the starting position, the length and the sequence of the keys that file. You can also optionally specify if the file is already sorted by the keys and if sequence checking of the keys is not needed, or stop reading the file after n records.

JOIN

JOIN tells gcsort how to match records in the JOIN command.

Inner join – Default, only paired records from F1 and F2 are processed.

Left outer join - Unpaired F1 records as well as paired records.

Right outer join - Unpaired F2 records as well as paired records.

Full outer join - unpaired F1 and F2 records as well as paired records.

Unpaired F1,ONLY - Only unpaired F1 records

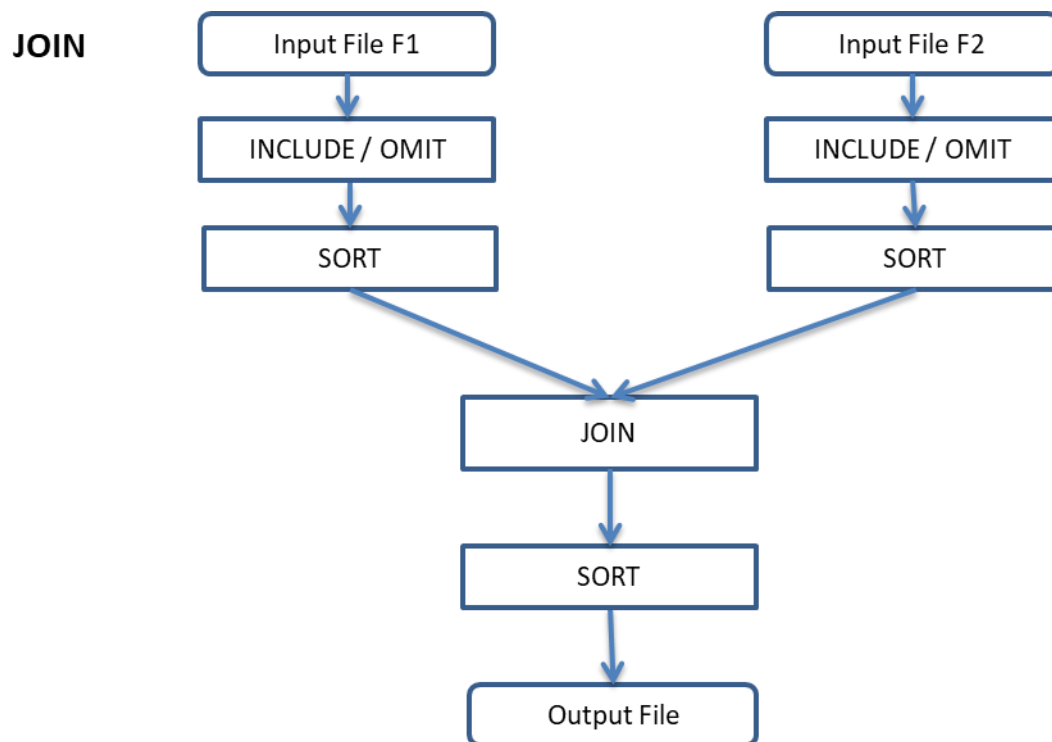
Unpaired F2,ONLY - Only unpaired F2 records

Unpaired F1,F2,ONLY / Unpaired,ONLY- Only unpaired F1 and F2 records

REFORMAT

REFORMAT statement specified the fields of F1 and/or F2 in the joined records.

7.1. Join Schema



For details *gcsort --help JOIN*

`gcsort --help JOIN`

```
gcsort help
gcsort is a utility to sort, merge, copy and join records in a file into a
specified order in GnuCOBOL environment.
```

```
Syntax case insensitive
Return code : 0 (ok) - 4 (warning) - 16 (error)
```

```
Usage with file parameters : gcsort <options> take filename
Usage from command line   : gcsort <options> <control statements>
```

```
gcsort options
-fsign=[ASCII|EBCDIC] define display sign representation
-fcolseq=[NATIVE|ASCII|EBCDIC] collating sequence to use
-febcdic-table=<cconv-table>/<file> EBCDIC/ASCII translation table
```

```
=====
Section for JOIN control statement
=====
```

```
JOIN file(s)
  USE                Declare input file F1
  USE                Declare input file F2
  GIVE               Declare output file
  JOINKEYS FILES=F1.. Declare keys file F1
    [ INCLUDE]      Input file F1 - Select input records that respect include
condition(s)
    [ OMIT   ]      Input file F1 - Omit input records that respect omit condition(s)
  JOINKEYS FILES=F2.. Declare keys file F2
    [ INCLUDE]      Input file F2 - Select input records that respect include
condition(s)
    [ OMIT   ]      Input file F2 - Omit input records that respect omit condition(s)
  UNPAIRED           Declare join type
  REFORMAT FIELDS    Declare output format
  [ INCLUDE]         Output file - Select input records that respect include condition(s)
  [ OMIT   ]         Output file - Omit input records that respect omit condition(s)
  [ INREC  ]         Output file - Reformat input record before join operation
  [ OUTFIL ]         Output file - Create one or more output files from join operation
```

```
JOIN
USE {Filename}          [File F1]
  ORG {Org}
  RECORD [F,{RecordLen}] | [V,{MinLen},{MaxLen}]
    [KEY ({Pos},{Len},{KeyType}[, {Collating}])]

USE {Filename}          [File F2]
  ORG {Org}
  RECORD [F,{RecordLen}] | [V,{MinLen},{MaxLen}]
    [KEY ({Pos},{Len},{KeyType}[, {Collating}])]

GIVE same parameters of USE

JOINKEYS FILES=F1,FIELDS=[({Pos},{Len},{Order}, ...)]
    [,SORTED] [,STOPAFT={nn}]
    [, INCLUDE ] | [, OMIT]
    [ COND=({Condition})[,FORMAT={FormatType}] ]

JOINKEYS FILES=F2,FIELDS=[({Pos},{Len},{Order}, ...)]
    [,SORTED] [,STOPAFT={nn}]
```

```

[, INCLUDE ] | [, OMIT]
      [ COND=({Condition})[,FORMAT={FormatType}] ]

JOIN UNPAIRED [,F1][,F2][,ONLY]
UNPAIRED,F1,F2 or UNPAIRED
      Unpaired records from F1 and F2 as well as paired records (Full outer join).
UNPAIRED,F1
      Unpaired records from F1 as well as paired records (Left outer join).
UNPAIRED,F2
      Unpaired records from F2 as well as paired records (Right outer join).
UNPAIRED,F1,F2,ONLY or UNPAIRED,ONLY
      Unpaired records from F1 and F2.
UNPAIRED,F1,ONLY
      Unpaired records from F1.
UNPAIRED,F2,ONLY
      Unpaired records from F2.

REFORMAT FIELDS=({File}:{Pos},{Len},{?},{File}:{Pos},{Len}.....) [,FILL=[C'constant']
| [X'hh']
Commands for output file
-----
INCLUDE | OMIT
      COND=({Condition})[,FORMAT={FormatType}]

INREC  FIELDS | INREC  BUILD =({FieldSpec})
INREC  OVERLAY =({FieldSpec})
OUTREC FIELDS | OUTREC BUILD =({FieldSpec})
OUTREC OVERLAY =({FieldSpec})

OUTFIL
      INCLUDE | OMIT ({Condition})[,FORMAT={FormatType}]
      OUTREC BUILD | BUILD = ({FieldSpec})
      FILES/FNAMES= {Filename}

```

{Parameters}	{Parameters}
{File} = F1 or F2	? = 1-byte indicator joined record
{Pos} = Field Position	'B' = 'Both' - Key found in F1 and F2
{Len} = Field Length	'1' = Key found in F1, but not in F2
{Order} = A(ascending) D(descending)	'2' = Key found in F1, but not in F1
C'Constant' = Character fill byte	nn = Numbers of records from input file
X'hh' = Hexadecimal fill byte (00-FF).	
{Parameters}	{Relational}
{FileName} = Filename or Env. Variable	EQ = Equal
{Pos} = Field Position	GT = GreaterThan
{Len} = Field Length	GE = GreaterEqual
{RecordLen} = Record Length	LT = LesserThan
{MinLen} = Min size of record	LE = LesserEqual
{MaxLen} = Max size of record	NE = NotEqual
{Order} = A(ascending) D(descending)	SS = Substring (only for Field Type 'CH')
{Condition}	
Format 1 - (Pos,Len,{FormatType},{Relational},{AND OR},Pos,Len,{FormatType})	
Format 2 - (Pos,Len,{FormatType},{Relational},{X C'[value]'} numeric value)	
Format 3 - ({Condition} ,{AND OR},{Condition})	
Format 4 - (Pos,Len,{FormatType},{Relational}, [DATE1][(+/-)num] [DATE2][(+/-)num] [DATE3][(+/-)num] [DATE4][(+/-)num]	
DATE - Current Date : DATE1 (C'yyyymmdd'), DATE2 (C'yyyymm'), DATE3 (C'yyyddd'), DATE4 (C'yyyy-mm-dd') (no Timestamp)	
[(+/-)num] [+num] future date, [-num] past date) only for DATE1,DATE2,DATE3	
{Org} File Organization	{KeyType} Mandatory for ORG = IX
LS = Line Sequential	P = Primary Key
SQ = Sequential Fixed or Variable	A = Alternative Key

IX = Indexed Fixed or Variable	AD = Alternative Key with Duplicates
RL = Relative Fixed or Variable	C = Continue definition
<hr/>	
{Collating} Collating Sequence	
ASCII = Ascii sequence	
EBCDIC = EBCDIC sequence	
<hr/>	
{FormatType} Field Format Type	{FormatType2} Format Type SumField
CH = Char	BI = Binary unsigned
BI = Binary unsigned	FI = Binary signed
FI = Binary signed	FL = Floating Point
FL = Floating Point	PD = Packed
PD = Packed	ZD = Zoned
ZD = Zoned	CLO = Numeric sign leading
CLO = Numeric sign leading	CSL = Numeric sign leading separate
CSL = Numeric sign leading separate	CST = Numeric sign trailing separate
CST = Numeric sign trailing separate	SS = Substring
<hr/>	
Format Len Type Date field	Format Len Type Date field
Y2T = 8 ZD CCYYMMDD	Y2D = 1 PD YY
Y2T = 4 ZD YYXX	Y2P = 2 PD YY
Y2T = 2 ZD YYX	Y2U = 3 PD YYDDD
Y2T = 3 ZD YY	Y2S = 2 ZD YY
Y2T = 5 ZD YYDDD	Y2V = 4 PD YYMMDD
Y2T = 6 ZD YYMMDD	Y2X = 3 PD DDDYY
Y2B = 1 BI YY	Y2Y = 4 PD MMDDYY
Y2C = 2 ZD YY	Y2Z = 2 ZD YY
<hr/>	
{FieldSpec} Field Specification	
pos, len	pos = position input record, len = length of field
posOut:pos,len	posOut = position output, pos = position input , len = length
n:X	Filling with Blank character from last position to n (absolute position of output record).
n:Z	Filling with zero Binary character from last position to n (absolute position of output record).
C'constant'	constant character value.
nC'constant'	repeat n times constant character value.
nX	repeat n times Blank character.
nZ	repeat n times Binary (0x00) character.
X'hh...hh'	hexadecimal characters.
nX'hh...hh'	repeat n times hexadecimal characters.
CHANGE=(vlen,[C X]<valueFind>,[C X]<valueSet>,...),NOMATCH=([C X]<valueSet>)	
CHANGE=(vlen,[C X]<valueFind>, posIn, lenIn), NOMATCH = (posIn, posLen)	
<hr/>	
Environment Variables	
<hr/>	
COB_VARSEQ_FORMAT	Used by GnuCOBOL
GCSORT_DEBUG	0 no print info, 1 info DEBUG, 2 for info Parser
GCSORT_MEMSIZE	Memory Allocation in byte (Default 512000000 byte)
GCSORT_PATHTMP	Pathname for temporary files (Default TMP / TEMP / TMPDIR)
GCSORT_STATISTICS	0 minimal informations, 1 for Summary, 2 for Details
GCSORT_TESTCMD	0 for normal operations , 1 for ONLY test command line (NO SORT)
<hr/>	

8. Environment Variables

8.1. Byte Order

GCSort can treat numeric fields in both binary format BigEndian or Native. To indicate a byte order is used environment variable GCSORT_BYTEORDER that assume 0 for Native or 1 for BigEndian. This value affects the treatment of SORT and SUM KEY FIELDS.

8.2. Temporary Files

When dimension of files input is greater of memory available, GCSort creates temporary files for sort operation. Temporary files is created in pathname specified from GCSORT_TMPFILE environment variable, if this value is not available, GCSort use TMP/TEMP environment variable or use current directory. For Windows the filename is composed from:

- Prefix = Srt
- Name = name (created from GetTempFileName())
- Extension = .tmp
-

For Linux file name is composed from:

- Prefix = Srt
- Name = PID of process GCSort
- Num = Progressive of file
- Extension = .tmp

Temporary files are destroyed after sort operation.

8.3. Memory Allocation

The environment variable GCSORT_MEMSIZE specify amount of memory that GCSORT will use for sort operation.

GCSort analyze the value and made two area for sort operation:

- (1) Key Area : this area is used for sort in memory
- (2) Data Area : this area contains data record

The optimization for use of memory GCSort check dimension of key and record.

Key Area = $[GCSORT_MEMSIZE] * ((Key\ Length + 8 + 4 + 8) / Record\ Length)$

Data Area = $[GCSORT_MEMSIZE] - Key\ Area$

(8 + 4 + 8) 8 is pointer of record into file, 4 record length, 8 pointer to record area in memory.

If value of $((\text{Key Length} + 8 + 4 + 8) / \text{Record Length})$ is minor of 15% or major of 50%, GCSORT force this value to 15%.

8.4.Statistics

GCSort produce in output a lot of information about execution.

You can setting GCSORT_STATISTICS environment variable to three values:

0 = minimal information

Example:

```
=====
GCSort Version 01.00.00
=====
TAKE file name
D:\GNU_COBOL\GCSort_1_0_0\gcsort_testcase\take\par_SORT_debug.par
=====
File : D:\GCSORTTEST\OCFILES\TEST9\INP000.txt
Size : 1194
=====
Record Number Total      : 15
Record Write Sort Total  : 0
Record Write Output Total : 15
=====
Start   : Mon Jan 25 11:17:55 2016
End     : Mon Jan 25 11:17:55 2016
Elapsed Time 00hh 00mm 00ss 000ms

Sort OK
```

1 = medium information

Example

```
=====
GCSORT
File TAKE : D:\GNU_COBOL\GCSort_1_0_0\gcsort_testcase\take\par_SORT_debug.par
=====
SORT FIELDS(3,1,CH,A)
USE D:\GCSORTTEST\OCFILES\TEST9\INP000.txt ORG LS RECORD V,1,27990
GIVE D:\GCSORTTEST\OCFILES\TEST9\OUT000.SRT ORG LS RECORD V,1,27990
=====
GCSort Version 01.00.00
=====
TAKE file name
D:\GNU_COBOL\GCSort_1_0_0\gcsort_testcase\take\par_SORT_debug.par
=====
Operation : SORT
```

```

INPUT FILE :
      D:\GCSORTTEST\OCFILES\TEST9\INP000.txt VARIABLE (1,27990) LS
OUTPUT FILE :
      D:\GCSORTTEST\OCFILES\TEST9\OUT000.SRT VARIABLE (1,27990) LS
SORT FIELDS : (3,1,CH,A)
=====
File : D:\GCSORTTEST\OCFILES\TEST9\INP000.txt
Size : 1194
=====
Record Number Total      : 15
Record Write Sort Total  : 0
Record Write Output Total : 15
=====
Start   : Mon Jan 25 11:20:01 2016
End     : Mon Jan 25 11:20:01 2016
Elapsed Time 00hh 00mm 00ss 000ms

Sort OK

```

2 = details information

```

=====
GCSORT
File TAKE : D:\GNU_COBOL\GCSort_1_0_0\gcsort_testcase\take\par_SORT_debug.par
=====
SORT FIELDS(3,1,CH,A)
USE D:\GCSORTTEST\OCFILES\TEST9\INP000.txt ORG LS RECORD V,1,27990
GIVE D:\GCSORTTEST\OCFILES\TEST9\OUT000.SRT ORG LS RECORD V,1,27990

=====
GCSort Version 01.00.00
=====
TAKE file name
D:\GNU_COBOL\GCSort_1_0_0\gcsort_testcase\take\par_SORT_debug.par
=====
Operation : SORT

INPUT FILE :
      D:\GCSORTTEST\OCFILES\TEST9\INP000.txt VARIABLE (1,27990) LS
OUTPUT FILE :
      D:\GCSORTTEST\OCFILES\TEST9\OUT000.SRT VARIABLE (1,27990) LS
SORT FIELDS : (3,1,CH,A)
=====
File : D:\GCSORTTEST\OCFILES\TEST9\INP000.txt
Size : 1194
After job_loadFiles      - Mon Jan 25 11:21:44 2016
After job_sort           - Mon Jan 25 11:21:44 2016
After job_save           - Mon Jan 25 11:21:44 2016
=====
Record Number Total      : 15
Record Write Sort Total  : 0
Record Write Output Total : 15
=====

Memory size for GCSort data : 133875000
Memory size for GCSort key  : 23625000
BufferedReader MAX_BUFFER   : 4063232
MAX_SIZE_CACHE_WRITE        : 4063232
MAX_SIZE_CACHE_WRITE_FINAL   : 4063232
MAX_MLTP_BYTE               : 63
BYTEORDER                   : 0

```

=====

Start : Mon Jan 25 11:21:44 2016
End : Mon Jan 25 11:21:44 2016
Elapsed Time 00hh 00mm 00ss 000ms

Sort OK

9. Command Line

GCSort command line accepts the following parameters:

gcsort	print version and options.
gcsort --help	print help.
gcsort --help SORT MERGE COPY JOIN	print help for specific control statement.
gcsort --version	print version.
gcsort --config	print the value of environment variables.
gcsort <i>command line</i>	execute command line.
gcsort TAKE <i>filename</i>	read filename where are present commands for Sort/Merge.

The file used in the TAKE command is free format.

10. Padding and Truncating

GCSort uses LIBCOB that defines how made record in write output operation.

Use LSF file organization when the record to be sorted contains trailing spaces and you need fixed-length records (GCSort does not delete trailing spaces).

Otherwise, you can set the environment variable COB_LS_FIXED=1 before running the GCSort command to NOT delete trailing spaces.

11. Return Code

GCSort has two values for return code:

1	for Success
4	for Warning
16	for Failure

12. File Conversion

GCSort permit to specify 'ORGANIZATION' and 'RECORD TYPE' for output data different structure from input data, to permit the conversion of file format.

In this case GCSort convert data from a structure to another structure, for example, from Sequential to Line Sequential or vice versa.

If you want sort a text file (LS) and you don't know the record length, you can specify RECORD V with max len very large, example:

```
SORT KEY (1,20,CH,A)
USE F1.TXT ORG LS RECORD V,1,3000
GIVE F1.TXT.OUT ORG LS RECORD V,1,3000
```

13. Performance and Tuning

For tuning performance of GCSort is good practices modify the settings of value for memory allocation and modify dimension of area for Memory Mapped File.

GCSORT_MEMSIZE Indicate amount of memory for sort.

GCSORT_MLT Indicate the number of views for MMF in temporary files. This number is multiplied by Page Size of system (example 65536). Increasing this value the view for read file in memory is more greater and can reduce the elapsed time.(Temporary files).

By default GCSORT_MLT assume 63 (Example: $63 * 65536 = 4\text{Mbyte}$ dimension of view for MMF).

14. Limits

The max numbers of input files for Merge is 16.

The max numbers of temporary files is 16. The temporary files is reused when the size of files input is more of size of (Memory GCSORT_MEMSIZE * 16 files).

15. Errors and Warnings

GCSORT produces two types of messages:

- Error format '*GCSort*Snnn'
- Warning format '*GCSort*Wnnn'

For Error message GCSort break execution and terminate operation with message and return code.

For Warning message GCSort continue execution and continue operation with message.

The message string identify a specific condition of error or warning, in the of warning print a specific action.

16. GCSort by examples

16.1. SORT

SORT single file

```
=====
SORT   FIELDS(3,1,CH,A)
USE     ../PJTestCaseSort/SQBI01          RECORD F,51 ORG SQ
GIVE    ../PJTestCaseSort/SQBI01.SRT.TST  RECORD F,51 ORG SQ
=====
```

SORT single file with INCLUDE condition

Order KEY

1) Position 37, Len 1, Character, Descending

2) Position 18, Len 17, Character, Ascending

Filter only records with character in position 37 Equal 'C'.

```
=====
SORT FIELDS=(37,1,CH,D,18,17,CH,A)
INCLUDE COND=(37,1,EQ,C'C') FORMAT=CH
USE   FIL_100.TXT          RECORD F,3000 ORG LS
GIVE  FIL_100.TXT.SRT      RECORD F,3000 ORG LS
=====
```

16.2. MERGE

MERGE

Merge files with KEY Position 1, Len 50, Char, Ascending

Input files sorted

Input Record Variable from 1 to 27990 ORGAnization Sequential

Output Record Variable from 1 to 27990 ORGAnization Sequential

```
=====
MERGE FIELDS(1,50,CH,A)
USE   D:\GCSORTTEST\OCFILES\RGX10.DAT    RECORD V,1,27990 ORG SQ
USE   D:\GCSORTTEST\OCFILES\RGX10.DAT    RECORD V,1,27990 ORG SQ
USE   D:\GCSORTTEST\OCFILES\RGX10.DAT    RECORD V,1,27990 ORG SQ
GIVE  D:\GCSORTTEST\OCFILES\RGX10.DAT.MRG RECORD V,1,27990 ORG SQ
=====
```

MERGE

FIELDS=COPY

Copy records from input to output.

Include condition check binary value (low-value)

Pos	Len	Condition	Value
from 305	04	Not Equal	Hex '00000000'

```
=====
USE D:\GCSORTTEST\FilesT\FIL_OUTFIL_500.TXT ORG LS RECORD F,3000
GIVE D:\GCSORTTEST\FilesT\FIL_OUTFIL_500_023.TXT.SRT ORG LS RECORD F,3000
OPTION VLSHRT,VLSCMP,EQUALS
MERGE FIELDS=COPY
INCLUDE COND=(305,4,NE,X'00000000'),FORMAT=CH
=====
```

16.3. COPY

COPY

Copy data from input to output with record filter.

Input FIXED Line Sequential, Output FIXED Line Sequential

Omitted (not insert in output file) records with condition:

- a) Position 1, Len 12, Equal , Character '000000006060'
- OR
- b) Position 1, Len 12, Equal , Character '000000000030'
- OR
- c) Position 1, Len 12, Equal , Character '000000000051'

```
=====
USE F1IN.DAT RECORD F,3000 ORG LS
GIVE F1IN.DAT_002.SRT RECORD F,3000 ORG LS
MERGE FIELDS=COPY
OMIT COND=(01,12,EQ,C'000000006060',OR,
           01,12,EQ,C'000000000030',OR,
           01,12,EQ,C'000000000051'),FORMAT=CH
=====
```

SORT without duplicates

Sort Key Pos 5, len 6, Ascending

SUM FIELDS = (NONE) delete duplicates

```
=====
USE FIL_OUTFIL_100.TXT ORG LS RECORD F,3000
GIVE FIL_OUTFIL_100_020.TXT.SRT ORG LS RECORD F,3000
SORT FIELDS=(5,6,A),FORMAT=CH,EQUALS
SUM FIELDS=(NONE)
=====
```

16.4. SUMFIELDS

SUMFIELDS

Sort Key Pos 1, len 1, Ascending

SUM FIELDS Binary fields

```
=====
SORT FIELDS(3,1,CH,A)
SUM FIELDS=(1,2,BI,7,3,BI,15,4,BI,20,3,BI,29,4,BI,34,8,BI,43,8,BI)
=====
```

```
USE    ../PJTestCaseSort/SQBI01 RECORD F,51 ORG SQ
GIVE   ../PJTestCaseSort/SQBI01.SRT.TST RECORD F,51 ORG SQ
```

16.5. OUTREC

OUTREC FIELDS/BUILD

SORT FIELDS = COPY (copy record NO Sort)

Format output : OUTREC

Output structure

Pos	Len	Value
01	16	Record input Pos:1,Len 16
17	2	Blank ('X' = blank)
19	2	Record input Pos:18,Len 2
21	1	Character '-'
23	2	Record input Pos:20,Len 2
25	1	Character '-'
26	2	Record input Pos:22,Len 2
28	2	2 blank

```
=====
USE    ../Files/FIL_OUTFIL_200.TXT                ORG LS RECORD F,3000
GIVE   ../Files/FIL_OUTFIL_200_007.TXT.SRT        ORG LS RECORD F,3000
SORT FIELDS=COPY
OUTREC=(01,16,2X,18,2,C'-' ,20,2,C'-' ,22,2,2X)
END
```

OUTREC FIELDS=(8,2, 20:5,10,3C'ABC' ,80:X)

Position Input	Len Input	Position output	Len output	Value
8	2	1	2	
5	10	20	10	Characters from pos 5, len10 from input
		30	9 (3 times x 3 char)	'ABCABCABC'
		80		Padding from 39 to 80

OUTREC FIELDS=(5C'LITERAL -' ,10X'414243' ,3X'525558' ,120,18)

Position Input	Len Input	Position output	Len output	Value
		1	45 (5 time x 9 char)	'LITERAL -LITERAL -LITERAL LITERAL-LITERAL-'
		46	30 (10 times 1 char hex)	'ABCABCABCABCABCABCABCABCABCABC'
		76	9 (3 times x 3 char hex)	'RUXRUXRUX'
80	18	85	18	Input record from 80 for 18 characters

OUTREC FIELDS=(1,40,60:Z,81:X)

Position Input	Len Input	Position output	Len output	Value
1	40	1	40	Input record from 1 for 40 characters
		41	20 (60 abs position - 40 current position)	20 characters with '00' binary
		61	20	21 characters with '20' space

16.6. OUTFIL

OUTFIL INCLUDE

Example with more files for OUTFIL

Each file output with Include condition

The purpose is merge files and write four output.

FNAMES=FOUT201_1

FOUT201_1 Environment Variable

FOUT201_2 Environment Variable

FOUT201_3 Environment Variable

FOUT201_SAVE Environment Variable

```
=====
USE ../FIL_OUTFIL_001.TXT      ORG LS RECORD F,3000
GIVE ../FIL_OUTFIL_001.TXT.OUT ORG LS RECORD F,3000
MERGE  FIELDS=COPY
OUTFIL INCLUDE=(01,03,CH,EQ,C'201',AND,24,03,CH,LE,C'999'),FNAMES=FOUT201_1
OUTFIL INCLUDE=(01,03,CH,EQ,C'210',AND,24,04,CH,GT,C'0000',AND,24,04,CH,LE,C'9999'),FNAMES=FOUT201_2
OUTFIL INCLUDE=(01,03,CH,EQ,C'230',AND,36,04,CH,GT,C'0000',AND,36,04,CH,LE,C'9999'),FNAMES=FOUT201_3
OUTFIL SAVE,FNAMES=FOUT201_SAVE
=====
```

OUTFIL OMIT

Format output record

OMIT Condition for input.

FOUTKEY_YES Environment Variable

FOUTKEY_NO Environment Variable

```
=====
USE D:\GCSORTTEST\FilesT\FIL_OUTFIL_050.txt ORG LS RECORD F,3000
GIVE D:\GCSORTTEST\FilesT\FIL_OUTFIL_050.txt.OUT ORG LS RECORD F,3000
  SORT FIELDS=COPY
  OUTFIL OMIT=(156,15,CH,LT,141,15,CH,AND,005,10,CH,EQ,C'KEYMAX800E'),FNAMES=FOUTKEY_YES
  OUTFIL SAVE,FNAMES=FOUTKEY_NO
  END
=====
```

16.7. INREC/OUTREC CHANGE

[INREC CHANGE]

INREC FIELDS=(15,6,25,3,CHANGE=(1,C'K12',X'41',C'M22',X'42',C'P32',X'43'),NOMATCH=(X'49'))

INREC

FIELDS=(1,15,16,2,CHANGE=(1,C'22',X'41',C'88',X'48',C'44',X'42',C'66',X'43'),NOMATCH=(X'49'),17,83)

[OUTREC CHANGE]

OUTREC FIELDS=(15,6,25,3,CHANGE=(1,C'K12',X'41',C'M22',X'42',C'P32',X'43'),NOMATCH=(X'49'),26,4974)

[CHANGE - Position]

OUTREC FIELDS=(1,1,CHANGE=(6,C'2',28,6),NOMATCH=(2,6),X,8,19,35,15,51,59)

16.8. SFF/UFF Field Type

SFF Input file: **inpSff04.txt**

\$58,272,300.10	5827230010
\$58,272,300.1	582723001
\$58,272,300	58272300
12-31-2004	-12312004
(402)-125-3721XXX	-4021253721
G1*** 52 \$ 21 R	15221
000128637.240	000128637240
+400.52	40052
+400.1	4001
173/821/9072/@3	17382190723
358,272,300.10	35827230010
358,272,300.1	3582723001
-358,272,300	-358272300
(82,316.90)	-8231690
12-31-2004	-12312004
G1*** 52 \$ 21 R	15221
G1***) 52 \$ 21 R	-15221
000128637.240	000128637240
400.52-	-40052
(\$400.5)	-4005
173/821/9072/@3	17382190723

Command :

**gcsort SORT FIELDS=(1,20,UFF,A) USE ..\tests\files\ inpSff04.txt ORG LSF RECORD F,42 GIVE ..\files\
inpSff04SFF.txt.srt ORG LSF RECORD F,42**

Sorted file : inpUff04SFF.txt.srt

(402)-125-3721XXX	-4021253721
-358,272,300	-358272300
12-31-2004	-12312004
12-31-2004	-12312004
(82,316.90)	-8231690
400.52-	-40052
G1***) 52 \$ 21 R	-15221
(\$400.5)	-4005
+400.1	4001
G1*** 52 \$ 21 R	15221
G1*** 52 \$ 21 R	15221
+400.52	40052
\$58,272,300	58272300
000128637.240	000128637240
000128637.240	000128637240
\$58,272,300.1	582723001
358,272,300.1	3582723001
\$58,272,300.10	5827230010
173/821/9072/@3	17382190723
173/821/9072/@3	17382190723
358,272,300.10	35827230010

UFF Input file: **inpUff04.txt**

\$58,272,300.10	5827230010
\$58,272,300.1	582723001
\$58,272,300	58272300
12-31-2004	12312004
(402)-125-3721XXX	4021253721
G1*** 52 \$ 21 R	15221
000128637.240	000128637240
+400.52	40052
+400.1	4001
173/821/9072/@3	17382190723
358,272,300.10	35827230010
358,272,300.1	3582723001
-358,272,300	358272300
(82,316.90)	8231690
12-31-2004	12312004
G1*** 52 \$ 21 R	15221
G1***) 52 \$ 21 R	15221
000128637.240	000128637240
400.52-	40052
(\$400.5)	4005
173/821/9072/@3	17382190723

Command :

**gcsort SORT FIELDS=(1,20,UFF,A) USE ../tests/files/inpUff04.txt ORG LSF RECORD F,42 GIVE
../files/inpUff04UFF.txt.srt ORG LSF RECORD F,42**

Sorted file : inpUff04UFF.txt.srt

+400.1	4001
(\$400.5)	4005
G1*** 52 \$ 21 R	15221
G1*** 52 \$ 21 R	15221
G1***) 52 \$ 21 R	15221
+400.52	40052
400.52-	40052
(82,316.90)	8231690
12-31-2004	12312004
12-31-2004	12312004
\$58,272,300	58272300
000128637.240	000128637240
000128637.240	000128637240
-358,272,300	358272300
\$58,272,300.1	582723001
358,272,300.1	3582723001
(402)-125-3721XXX	4021253721
\$58,272,300.10	5827230010
173/821/9072/@3	17382190723
173/821/9072/@3	17382190723
358,272,300.10	35827230010

16.9. DATE

```
[ DATE - Currente Date : DATE4 ]
INCLUDE COND=(1,13,CH,GT,DATE4)
USE ../files/inp5000.txt ORG LS RECORD F,5000
GIVE ../files/inp5000.txt.srt ORG LS RECORD F,5000
SORT FIELDS=(35,5,ZD,A)
```

```
[ DATE + / - day - month ]
COND=(1,13,CH,GT,DATE1+5)
COND=(1,13,CH,GT,DATE1-5)
```

```
COND=(1,13,CH,GT,DATE2+3)
COND=(1,13,CH,GT,DATE2-8)
```

```
COND=(1,13,CH,GT,DATE3+150)
COND=(1,13,CH,GT,DATE3-15)
```

```
[ DATE4 ]
OMIT COND=(1,13,CH,GT,DATE4)
```

16.10. RECORD CONTROL STATEMENT

```
[ RECORD CONTROL STATEMENT ]
```

```
SORT FIELDS=(8,5,CH,A) USE ../files/sqbig01.dat ORG SQ GIVE ../files/sqbig01_gcs.srt ORG SQ
RECORD TYPE=F, LENGTH=500
```

```
RECORD TYPE=F, LENGTH=(500)
```

```
RECORD TYPE=F, LENGTH=(500, ,500)
```

```
RECORD TYPE=F LENGTH=(, ,500)
```

```
RECORD TYPE=F,LENGTH=(, ,500)
```

16.11. DATE - Option Y2PAST

```
[ DATE - Y2PAST ]
SORT FIELDS=(10,8,Y2T,A)
USE FDate.dat RECORD F,85 ORG SQ
GIVE FDate.dat.Y2T8.srt RECORD F,85 ORG SQ
OPTION Y2PAST=80
```