GCSORT 1.0

[15 GEN 2015 Version]

User’s Guide

1nd Edition, 15 Janury 2016

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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
1st	15 Jan 2016	INITIAL RELEASE OF DOCUMENT
	09 Nov 2016	UPGRADE version with integration of LIBCOB New Data Types SubString search Conditional
	15 Oct 2020	New option in command line -fsign=EBCDIC/ASCII for NUMERIC field.

Table of Contents

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 1.0.0 of GCSort contains a follow constructs:

```
 gcsort help
 gcsort is a  program to sort, merge and copy records in a file into a specified order
```

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

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

```
gcsort control statements
Notations: '{name}' = parameters , '|' = Alternative format of control statement
```

```
   SORT | MERGE FIELDS Control statement for Sort or Merge file(s)
     USE                 Declare input file(s)
     GIVE                Declare output file
     [ SUM FIELDS ]      Sum fields for same record key, or eliminate duplicate keys)
     [ INCLUDE    ]      Select input records that respect include condition(s)
     [ OMIT       ]      Omit input records that respect include 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
     [ OPTION     ]      Specifies option for control statements
```

```
    gcsort
        SORT | MERGE
             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})]
        GIVE same parameters of USE
        SUM FIELDS = [({Pos},{Len},{FormatType2}, ...)]         |
                     [({Pos},{Len}, ...)],FORMAT={FormatType2}  |
                     [NONE] | [(NONE)]
        INCLUDE | OMIT
                COND=({Condition})[,FORMAT={FormatType}]

        INREC   FIELDS | INREC   BUILD =({FieldSpec})
        OUTREC  FIELDS | OUTREC  BUILD =({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
___________________________________________________________________________________
___{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} )
__________________________________________________________________________________________
___{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           |  D  = Alternative Key with Duplicates
  RL  = Relative Fixed or Variable          |  C  = Continue definition
____________________________________________|_____________________________________________
__{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      |
____________________________________________|_____________________________________________
____{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 (absoluteposition 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 hexdecimal characters.

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
- **mpir** / **libgmp** - GNU MP

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>*
    - <option> -fsign=[EBCDIC | ASCII]

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

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

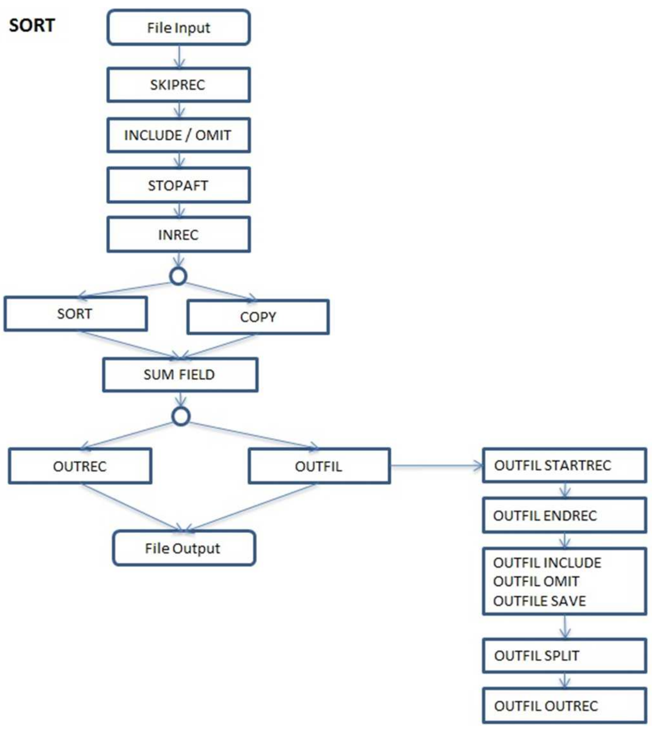
- Run : *gcsort* TAKE *filename*

Example to create TAKE file with script sh.

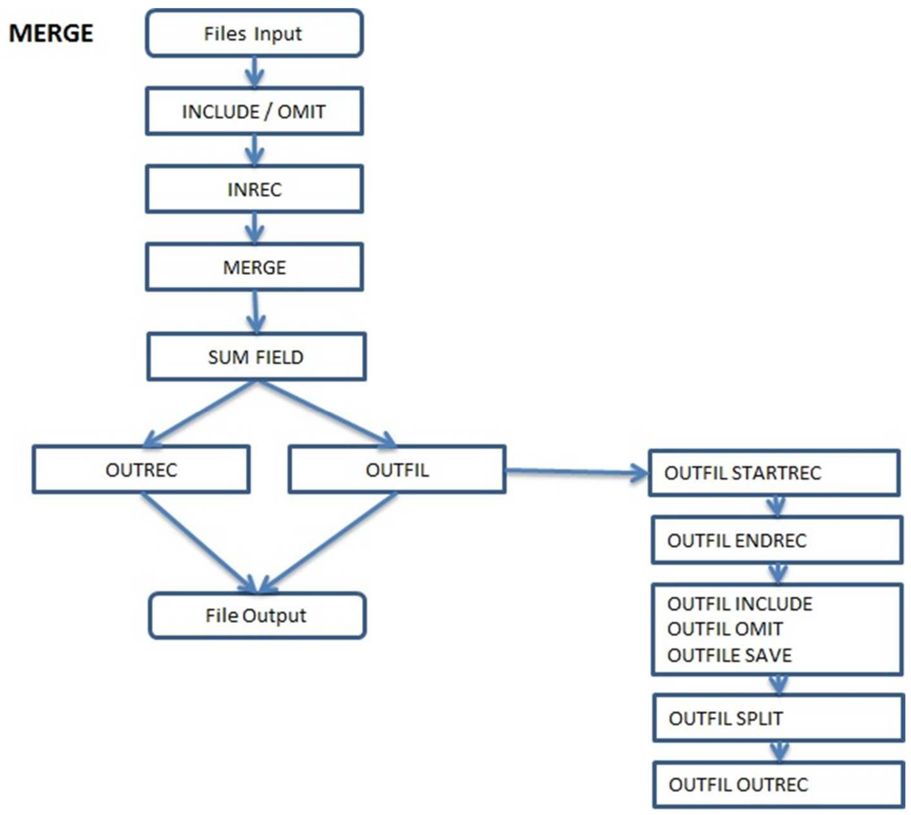
```
export LD_LIBRARY_PATH=/usr/local/lib
export GCSORT_MEMSIZE=1024000000
export GCSORT_BYTEORDER=0
export GCSORT_STATISTICS=2
echo "    * This is comment "                          >TAKEFILE.PRM
echo "SORT FIELDS(4,1,CH,A) "                          >TAKEFILE.PRM
echo "SUM  FIELDS=(1,2,ZD,4,2,ZD,7,4,ZD,12,4,ZD)     " >>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
```

4. Process Schema

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



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



5. 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.

6. 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.

7. File Organization and Record Type

File organization identifies the type of file.
The types of file organization utility managed GCSORT are:

LS	= Line Sequential
SQ	= Sequential
IX	= Indexed
RL	= Relative

Record type identifies the record structure
Record type are

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

8. Field Type

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

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

9. Commands

9.1. SORT

SORT is command for ordering data.

Format 1 **SORT**

9.2.MERGE

MERGE is command for merging data.

Format 1 **MERGE**

9.3.COPY

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

Format 1 **FIELDS=COPY**

9.4.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

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.

9.5.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})

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

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	Minimun 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
	D = Alternative Key with Duplicates
	C = Continue definition

9.6.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})

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

9.7.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

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	SubString

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

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.

9.8.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...)

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

OUTREC defines structure record output for output file.

Format 1	OUTREC FIELDS=(FIELD-SPEC...)
Format 2	OUTREC BUILD=(FIELD-SPEC...)

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'	hexdecimal string .
nX'hh…hh'	repeat **n** times hexdecimal string .

9.9.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.

9.10. 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*).

9.11. OPTION

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

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

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

10. Environment Variables

10.1. 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.

10.2. 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.

10.3. 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 ((Key Length + 8 + 4 + 8)/ Record Length) is minor of 15% or major of 50%, GCSORT force this value to 15%.

10.4. 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
```

11. Command Line

GCSort command line accepts the following parameters:

gcsort	print version and options.
gcsort --help	print help.
gcsort --version	print version.
gcsort --config	print the value of environment variables.
gcsort ***command line***	execute command line.
gcsort TAKE ***filename***	read filename where are present commands for Sort/Merge.

The file used in the TAKE command is free format.

12. Padding and Truncating

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

13. Retun Code

GCSort has two values for return code:

0	for success
16	for failure

14. 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
```

15. 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 = 4Mbyte dimension of view for MMF).

16. 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).

17. 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 o warning, in the of warning print a specific action.

18. GCSort by examples

18.1. 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
=====================================================
```

18.2. 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
========================================================================
```

18.3. 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)
=====================================================
```

18.4. 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
```

18.5. 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

18.6. 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
================================================================================
```