FUJITSU Software
NetCOBOL V11.0

Getting Started

Linux(64)

Preface

This manual provides an introduction to NetCOBOL. NetCOBOL provides a full-featured development environment for COBOL programs. It allows you to develop COBOL programs that also easily integrate with other languages.

The sample programs shipped with NetCOBOL are intended to give an overview of the capabilities of NetCOBOL. Refer to the "NetCOBOL User's Guide" for further details on using NetCOBOL.

Audience

Prior to using NetCOBOL, it is assumed that you have the following knowledge:

- You have some basic understanding as to how to navigate through and use the Linux product on your machine.

- You understand the COBOL language from a development perspective.

Product Names

Product Name	Abbreviation
Red Hat(R) Enterprise Linux(R) 6 (for Intel64)	Linux or Linux(64)
Red Hat(R) Enterprise Linux(R) 7 (for Intel64)	
Microsoft(R) Windows Server(R) 2012 R2 Datacenter	Windows
Microsoft(R) Windows Server(R) 2012 R2 Standard	
Microsoft(R) Windows Server(R) 2012 R2 Essentials	
Microsoft(R) Windows Server(R) 2012 R2 Foundation	
Microsoft(R) Windows Server(R) 2012 Datacenter	
Microsoft(R) Windows Server(R) 2012 Standard	
Microsoft(R) Windows Server(R) 2012 Essentials	
Microsoft(R) Windows Server(R) 2012 Foundation	
Microsoft(R) Windows Server(R) 2008 R2 Standard	
Microsoft(R) Windows Server(R) 2008 R2 Enterprise	
Microsoft(R) Windows Server(R) 2008 R2 Foundation	
Microsoft(R) Windows Server(R) 2008 R2 Datacenter	
Windows(R) 8.1	
Windows(R) 8.1 Pro	
Windows(R) 8.1 Enterprise	
Windows(R) 8	
Windows(R) 8 Pro	
Windows(R) 8 Enterprise	
Windows(R) 7 Home Premium	
Windows(R) 7 Professional	
Windows(R) 7 Enterprise	
Windows(R) 7 Ultimate	

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Contents

Chapter 1 New Features

This chapter provides an outline of the new features included in the latest release.

NetCOBOL

- Encoding form support

  Encoding form UTF-32 and Shift-JIS can now be used.

- Hadoop support

  The Hadoop integration function can now be used.

- Named pipe of COBOL File Access Routines

  Named pipe of COBOL File Access Routines is supported.

Chapter 2 Sample Programs

The sample programs shipped with NetCOBOL are intended to give an overview of the capabilities of NetCOBOL. Refer to the "NetCOBOL Use's Guide" for further details on using NetCOBOL. The following table details the sample programs available with NetCOBOL.

The sample programs are stored in the NetCOBOL install directory. Please copy to use the sample programs. In this chapter, it is assumed that sample programs are copied to /home/samples.

```
/opt/FJSVcbl64/samples
```

NetCOBOL Sample Programs

- Sample 1

  Data Processing Using Standard Input-Output

- Sample 2

  Using Line Sequential and Indexed Files

- Sample 4

  Calling Subprograms

- Sample 5

  Receiving a Command Line Argument

- Sample 6

  Environment Variable Handling

- Sample 7

  Using a Print File

- Sample 8

  Using a Print File (Advanced usage)

- Sample 9

  Using a Print File with a FORMAT clause

- Sample 10

  Basic Object-Oriented Programming

2.1 Sample 1: Data Processing Using Standard Input-Output

Sample 1 demonstrates using the ACCEPT/DISPLAY function to input and output data.

Refer to the "NetCOBOL User's Guide" for details on how to use the ACCEPT/DISPLAY statements.

Overview

Inputs an alphabetic character (lowercase character) from the console, and outputs a word to the console beginning with the input alphabetic character.

Files Included in Sample 1

- sample1.cob (COBOL source program)

- Makefile

COBOL Functions Used

- ACCEPT/DISPLAY

COBOL Statements Used

- ACCEPT

- DISPLAY

- EXIT

- IF

- PERFORM

Compiling, Linking and Executing the Program

- Using the cobol command

```
$ cobol -M -o sample1 sample1.cob
STATISTICS: HIGHEST SEVERITY CODE=I, PROGRAM UNIT=1
$ ./sample1
Input a lower alphabet character =>                    a
apple
$
```

- Using the make command

```
$ make

$ ./sample1
Input a lower alphabet character =>                    a
apple
$
```

2.2 Sample 2: Using Line Sequential and Indexed Files

Sample 2 demonstrates a program that reads a data file (line sequential file) created with the Editor, and then creates a master file (indexed file).

Refer to the "NetCOBOL User's Guide" for details on how to use line sequential files and indexed files,.

Overview

Reads a data file (line sequential file) that contains product codes, product names, and unit prices, and creates an indexed file with the product code as a primary record key and the product name as an alternate record key.

Figure 2.1 Creating an indexed file from a line sequential file

Line sequential file

| 0123 | SCARE | 0200 |
| 0456 | BALL-PEN | 0100 |

4 alphanumeric characters

40 alphanumeric characters

4 digit number [External decimal]

◁ : Line feed code

Index file

| 0123 | SCARE | 0200 |
| 0456 | BALL-PEN | 0100 |

4 alphanumeric characters (Primary record key)

40 alphanumeric characters (Alternate record key)

4 digit number [Binary]
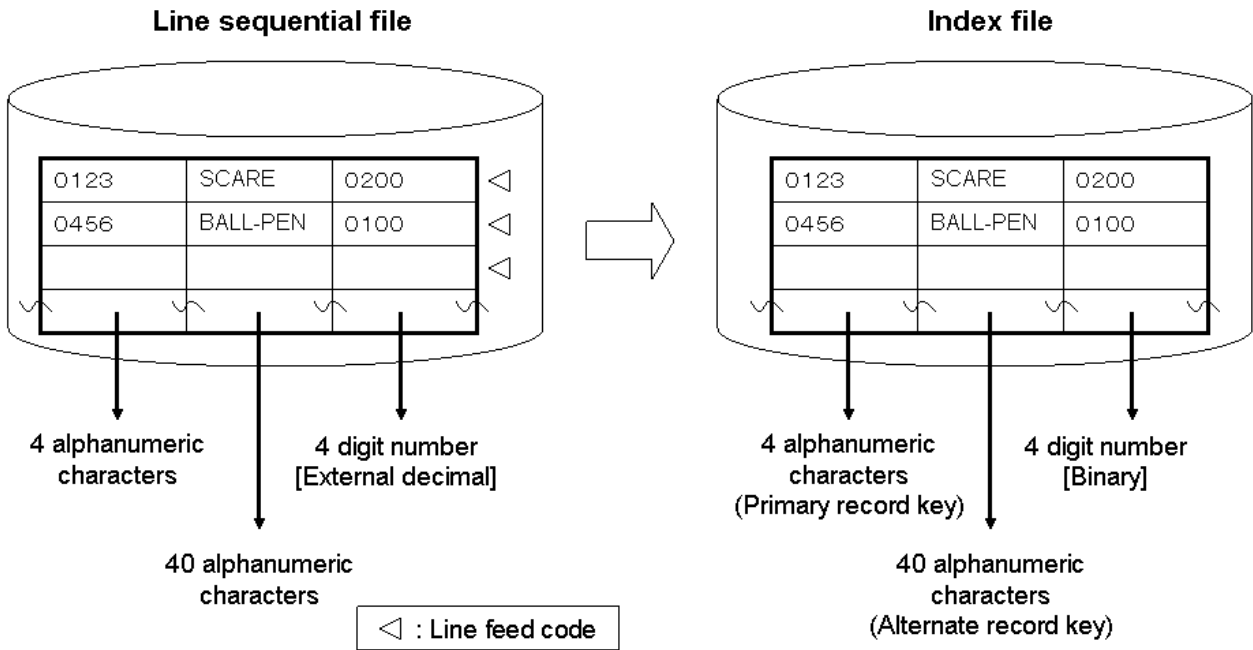
Files Included in Sample 2

- sample2.cob (COBOL source program)

- datafile (Data file)

- Makefile

COBOL Functions Used

- Line Sequential Files (Reference)

- Indexed Files (Creation)

COBOL Statements Used

- CLOSE

- EXIT

- GO TO

- MOVE

- OPEN

- READ

- WRITE

Compiling, Linking and Executing the Program

- Using the cobol command

```
$ cobol -M -o sample2 sample2.cob
STATISTICS: HIGHEST SEVERITY CODE=I, PROGRAM UNIT=1
$ INFILE=datafile; export INFILE
$ OUTFILE=master; export OUTFILE
$ ./sample2
$
```

- Using the make command

```
$ make

$ INFILE=datafile; export INFILE
$ OUTFILE=master; export OUTFILE
$ ./sample2
$
```

Information
. . . .

When a file-identifier is specified in the COBOL source program ASSIGN clause, a file must be assigned before program execution. When assigning a file, use a file-identifier as an environment variable name and specify the file name to be used in the environment variable. In this sample program, environment variable INFILE is used to assign a data file (line sequential file); OUTFILE is used to assign a master file (indexed file).
. . . .

Note
. . . .

If a file named 'master' already exists, the original file contents are lost.
. . . .

2.3 Sample 4: Calling Subroutines

Sample 4 demonstrates that calling a subroutine by the CALL statement from the COBOL program. For details of the calling relationship among COBOL programs, refer to the "NetCOBOL User's Guide".

Overview

This sample converts article codes, article names, and prices stored in the master file into printable characters, places them in a work text file "work" (created in the current directory), calls the print processing subprogram (print.cob), and prints the contents of the work text file.

Files included in sample 4

- sampl4.cob (COBOL source program)

- print.cob (COBOL source program)

- s_rec.cbl (COBOL library file)

- master (master file)

- Makefile

- COBOL.CBR (Runtime initialization file)

COBOL Functions Used

- Inter-Program Communication

- Library file with the COPY statements

- ACCEPT/DISPLAY

- Print Files

- Indexed Files (Reference)

- Line sequential Files (Creation)

- Runtime parameter

COBOL Statements used

- CALL

- DISPLAY

- EXIT

- GO TO

- IF

- MOVE

- OPEN

- READ

- SET

- WRITE

Compiling, Linking and Executing the Program

- Using the cobol command

```
$ cobol -c -WC,"NOALPHAL" print.cob
STATISTICS: HIGHEST SEVERITY CODE=I, PROGRAM UNIT=1
$ cobol -M -osample4 -WC,"NOALPHAL" sample4.cob print.o
HIGHEST SEVERITY CODE = I
STATISTICS: HIGHEST SEVERITY CODE=I, PROGRAM UNIT=1
$ ./sample4
$ cat work | more
0123 ruler                              02.00
0456 ball-point pen                     01.00
0789 protractor                         00.50
0812 cutter                             02.50
0823 scissors                           04.50
0834 punch                              05.00
0845 fluorescent pen                    01.00
0856 automatic pencil                   02.00
0867 eraser                             01.00
0889 stamp pad                          08.00
0934 gum tape                           03.80
0956 tape cutter                        08.50
0967 binding                            01.20
0978 rubber band                        03.80
0989 paste                              01.50
0990 binder clip                        00.30
0995 magnet                             01.50
0999 clip                               02.50
1012 thumbtack                          02.00
1123 card case(B5)                      01.50
1234 card case(A4)                      02.20
1345 stapler                            02.80
--More-
```

- Using the make command

```
$ make

$ ./sample4
$ cat work | more
0123 ruler                              02.00
0456 ball-point pen                     01.00
0789 protractor                         00.50
0812 cutter                             02.50
```

```
0823 scissors                        04.50
0834 punch                           05.00
0845 fluorescent pen                 01.00
0856 automatic pencil                02.00
0867 eraser                          01.00
0889 stamp pad                       08.00
0934 gum tape                        03.80
0956 tape cutter                     08.50
0967 binding                         01.20
0978 rubber band                     03.80
0989 paste                           01.50
0990 binder clip                     00.30
0995 magnet                          01.50
0999 clip                            02.50
1012 thumbtack                       02.00
1123 card case(B5)                   01.50
1234 card case(A4)                   02.20
1345 stapler                         02.80
--More-
```

2.4 Sample 5: Receiving a Command Line Argument

Sample 5 demonstrates a program that receives an argument specified at program execution, using the command line argument handling function (ACCEPT FROM argument-name/argument-value).

Refer to "Using ACCEPT and DISPLAY Statements" in the "NetCOBOL User's Guide" for details on how to use the command line argument handling function.

Sample 5 also calls an internal program.

Overview

The sample program calculates the number of days from the start date to the end date. The start and end dates are specified as command arguments in the following format:

```
sample5   start-date   end-date
```

start-date, end-date:

Specify a year, month, and day between January 1, 1900 and December 31, 2172 in the YYYYMMDD format.

Files Included in Sample 5

- sample5.cob (COBOL source program)

- Makefile

COBOL Functions Used

- Fetching Command Line Arguments

- Internal Programs

COBOL Statements Used

- ACCEPT

- CALL

- COMPUTE

- COPY

- DISPLAY

- DIVIDE

- EXIT

- GO TO

- IF

- MOVE

- PERFORM

Compiling, Linking and Executing the Program

- Using the cobol command

```
$ cobol -M -o sample5 sample5.cob
STATISTICS: HIGHEST SEVERITY CODE=I, PROGRAM UNIT=1
$ ./sample5 19710406 20000501
Difference between two dates is +10617 days.
$
```

- Using the make command

```
$ make

$ ./sample5  19710406 20000501
Difference between two dates is +10617 days.
$
```

2.5 Sample 6: Environment Variable Handling

Sample 7 demonstrates a program that changes the value of an environment variable during COBOL program execution, using the environment variable handling function (ACCEPT FROM/DISPLAY UPON environment-name/environment-value).

Refer to "Using ACCEPT and DISPLAY Statements" in the "NetCOBOL User's Guide" for details on how to use the environment variable handling function.

Overview

The sample program divides a master file (the indexed file created in Sample 2) that contains product codes, product names, and unit prices into two master files according to product codes. The following table shows the division method and the names of the two new master files:

Table 2.1 Division of the master files

Product Code	File Name
Code beginning with 0	master-file-name.A
Code beginning with a non-zero value	master-file-name.B

Files Included in Sample 6

- sample6.cob (COBOL source program)

- master (master file)

- Makefile

COBOL Functions Used

- Environment Variable Handling

- Indexed Files

COBOL Statements Used

- ACCEPT

- CLOSE

- DISPLAY

- EXIT

- GO TO

- IF

- MOVE

- OPEN

- READ

- STRING

- WRITE

Compiling, Linking and Executing the Program

- Using the cobol command

```
$ cobol -M -o sample6 sample6.cob
STATISTICS: HIGHEST SEVERITY CODE=I, PROGRAM UNIT=1
$ INFILE=master; export INFILE
$ OUTFILE=; export OUTFILE
$ ./sample6
$ ls mas*
master   master.a   master.b
$
```

- Using the make command

```
$ make

$ INFILE=master; export INFILE
$ OUTFILE=; export OUTFILE
$ ./sample6
$ ls mas*
master   master.a   master.b
$
```

Information

When a file-identifier is specified in the COBOL source program ASSIGN clause, a file must be assigned before program execution. Specify the file name to be used in an environment variable using a file-identifier as the environment variable name. In this example, environment variable INFILE is used to assign a master file; OUTFILE is used to assign a new file. When a new file is created, any fileidentifier can be set before program execution because a file is assigned by an environment variable.

Note

If files master.a and master.b already exist, the original file contents are lost.

2.6 Sample 7: Using a Print File

Sample 7 demonstrates a program that outputs data (input from the console window) to a printer using a print file. Refer to "Printing" in the "NetCOBOL User's Guide" for details on using a print file.

Overview

The sample program inputs data of up to 40 alphanumeric characters from the console window, and outputs the data to the printer.

Files Included in Sample 7

- sample7.cob (COBOL source program)

- Makefile

- COBOL.CBR (Runtime initialization file)

COBOL Functions Used

- Print Files

- ACCEPT/DISPLAY

COBOL Statements Used

- ACCEPT

- CLOSE

- EXIT

- GO TO

- IF

- OPEN

- WRITE

Compiling, Linking and Executing the Program

- Using the cobol command

```
$ cobol -M -o sample7 sample7.cob
STATISTICS: HIGHEST SEVERITY CODE=I, PROGRAM UNIT=1
$ ./sample7
12345678901234567890123456789012345678901234567890
abcde
*********sample7***********************
/END
$
```

- Using the make command

```
$ make

$ ./sample7
12345678901234567890123456789012345678901234567890
abcde
*********sample7***********************
/END
$
```

At program termination, data is printed to the default printer.

```
123456789012345678901234567890123456789O
abcde********sample7*******************        ...(*1)
```

*1 : In this sample program, the first ACCEPT statement execution ends when 40 characters are entered. Accordingly, the sum of second and third input data becomes input for the second ACCEPT statement execution in the program.

2.7 Sample 8: Using a Print File (Advanced usage)

Sample 8 demonstrates the following:

- Using a print file without a FORMAT clause

- Using the I control record to set and change page forms, in combination with Forms Control Buffers (FCBs)

- Using the CHARACTER TYPE clause to control letter size and pitch

- Using the PRINTING POSITION clause to control the layout (line / column)

Refer to "How to Print Data Line Mode Using a print File" and "How to Use a Control Record" in the "NetCOBOL User's Guide" for details on using a print file without a FORMAT clause.

Overview

The sample program is a instance for a print file that includes control records, the CHARACTER TYPE clause, and the PRINTING POSITION clause but not the FORMAT clause, which is used to set various specifications.

Files Included in Sample 8

- sample8.cob (COBOL source program)

- kol5/A4L6 (FORM overlay pattern)

- kol5/A4L8 (FORM overlay pattern)

- kol5/B4OV (FORM overlay pattern)

- fcbe/A4L6 (FCB)

- fcbe/A4L8 (FCB)

- fcbe/LPI6 (FCB)

- infofile/PRTINFO.PostScript (print information file)

- Makefile

- sample8.sh (shell script file for execution)

COBOL Functions Used

- Print Files

- ACCEPT/DISPLAY

COBOL Statements Used

- ADD

- CLOSE

- DISPLAY

- IF

- MOVE

- OPEN

- PERFORM

- STOP

- WRITE

Compiling and Linking the Program

It is assumed that the sample programs are copied to /home/samples/sample08.

```
$ cd /home/samples/sample08
$ COBPATH=/home/samples/sample08; export COBPATH
$ make
 ...
```

Executing the Program

The following is an example from Sample Program 8.

```
$ cd /home/samples/sample08
$ COBPATH=/home/samples/sample08; export COBPATH
$ ./sample08.sh
```

At program termination, the sample pages described are printed to default printer.

2.8 Sample 9: Using a Print File with a FORMAT clause

Sample 9 demonstrates a program that the print a summary sheet to the printer with a print file with a FORMAT clause.

Refer to "Using Print Files with a FORM Descriptor" in the "NetCOBOL User's Guide" for details on how to use a print file with a FORMAT clause.

To execute this sample program, PowerFORM RTS is required.

Overview

This sample program inputs the master file (master) which contains commodity codes, commodity names and prices, and the sales file (sales) which contains dates, quantities and prices for the order. And it outputs the sales summary sheets to the printer.

FORM Descriptor used

Sales Summary Sheet (SYUUKEI.pmd)

Form	Summary Sheet Form	
Paper size	A4	
Page orientation	Portrait	
Line pitch	1/6 inches	
Partition	PH (Page Heders)	Fixed Partition, Starting Position: 0 inch (1st line), Line width: 1 inch (6 lines)
	CH1 (Control Headers)	Floating Partition, Line width: 0.83 inches (5 lines)
	DE (Details)	Floating Partition, Line width: 0.33 inches (2 lines)
	CF1 (Control Footers)	Floating Partition, Line width: 0.83 inches (5 lines)
	CF2 (Control Footers)	Floating Partition, Line width: 0.67 inches (4 lines)
	PF (Page Footers)	Fixed Partition, Starting Position: 10.48 inches (63rd line), Line width: 0.49 inches (3 lines)

Programming Points

- The partition PH and PF are fixed partitions. These have information on a fixed print position. Therefore, whenever these partitions are printed, it is printed to starting position defined in the partition.

- The partition CH1, DE, CF1 and CF2 are floating partition. There is no position information of the print. It does not have the starting position information of the print. Therefore, it is possible to output it to a free position. However, it is necessary to control the print position in the program.

- When compiling, output item defined in the partition is converted from FORM Descriptor into the record format by the COPY statement. In this case, item name of the defined output item is interpreted as a data name.

Files Included in Sample 9

- sample9.cob (COBOL source program)
- SYUUKEI.pmd (FORM descriptor file)
- SYOHINM.cbl (COBOL library file)
- URIAGE.cbl (COBOL library file)
- mefprc (print information file)
- Makefile
- sales (indexed file)
- master (master file)
- COBOL.CBR (Runtime initialization file)

COBOL Functions Used

- Print File with a FORMAT clause
- Indexed Files (Reference)
- Library file with the COPY statements
- ACCEPT/DISPLAY

COBOL statements used

- OPEN
- READ
- WRITE
- START
- CLOSE
- PERFORM
- DISPLAY
- IF
- MOVE
- SET
- GO TO
- EXIT
- COPY
- ADD

Before executing the sample program

Modify the printer information file (mefprc) depending on your operating environment.

```
PRTNAME printer-name
MEDDIR /opt/FJSVcbl64/samples/en_US.UTF-8/sample09
```

PRTNAME: Printer name to print the sample form.

MEDDIR : Specify the directory name in which the form descriptor (SYUUKEI.pmd) is stored.

For details on the printer information file, refer to "PowerFORM Runtime Reference".

Compiling, Linking and Executing the Program

- Using the cobol command

```
$ cobol -M -o sample9 sample9.cob
STATISTICS: HIGHEST SEVERITY CODE=I, PROGRAM UNIT=1
$ ./sample9
$
```

- Using the make command

```
$ make

$ ./sample9
$
```

2.9 Sample 10: Basic Object-Oriented Programming

This program illustrates basic object-oriented programming functions including encapsulation, object generation and method invocation.

Overview

In the sample program, three employee objects are generated. After an object has been generated using the "NEW" method, the "Data-Set" method is invoked to set the data.

Although all of the employee objects have the same form, they have different data (employee numbers, names, departments and sections, and address information). Address information containing postal codes and addresses also belongs to an object.

Upon input of an employee number on the screen, the appropriate "Data-Display" method in the employee object is invoked, and the employee information in the object is displayed.

The employee object invokes the "Data-Get" method of the associated address object to acquire the address information.

The employee object consists of three pieces of data and an object reference to an address object. The structure of the object is transparent to the main program user. However, the user must understand the "Data-Set" and "Data-Display" methods.

The encapsulation of data completely masks the information in the object.

Files Included in Sample 10

- main.cob (COBOL source program)

- member.cob (COBOL source program)

- address.cob (COBOL source program)

- Makefile

COBOL Functions used

- Object-oriented programming function

  - Class definition (Encapsulation)

  - Object generation

  - Method invocation

Object-Oriented Syntax used

- INVOKE and SET statements

- REPOSITORY paragraph

- Class, object and method definitions

Compiling, Linking and Executing the Program

```
$ make
cobol -c -WC,"CREATE(REP)" -dr. address.cob
STATISTICS: HIGHEST SEVERITY CODE=I, PROGRAM UNIT=1
cobol -c -WC,"CREATE(REP)" -dr. member.cob
STATISTICS: HIGHEST SEVERITY CODE=I, PROGRAM UNIT=1
cobol -dr. -M -c main.cob
STATISTICS: HIGHEST SEVERITY CODE=I, PROGRAM UNIT=1
cobol -dr. -c address.cob
STATISTICS: HIGHEST SEVERITY CODE=I, PROGRAM UNIT=1
cobol -dr. -c member.cob
STATISTICS: HIGHEST SEVERITY CODE=I, PROGRAM UNIT=1
cobol -o sample10 main.o address.o member.o
$ ./sample10
Enter an employee number (1, 2, or 3)
1

NO.---NAME-------------BELONGING---------POST----ADDR------------------------
0001  Todd A.Yancey    Language group    411-0007 3055 Orchard Drive San Jose,CA

Do you want to quit? (Y/N)
Y

$
```

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