COBOL for AIX

IBM

Source conversion utility (scu)

COBOL for AIX

Source conversion utility (scu)

Contents

Source conversion utility (scu)

The source conversion utility, scu, is a stand-alone AIX® program that assists in the conversion of COBOL source programs from non-IBM or free-format source formats to a format that can be compiled by COBOL for AIX.

Scu performs the following transformations:
- Converts white space characters to true spaces, including tab expansion, with optional controls
- Normalizes line-end characters
- Repositions items to start in the proper areas, such as the indicator area, Area A, or Area B, as required
- Ensures special alignment for CBL (PROCESS) statements
- Optionally blanks sequence numbers in columns 1 through 6, and removes serial numbers in columns 73 through 80
- Converts anomalous fixed-source-format input by default, and optionally converts free-format input

It also makes the following syntax and semantic fixes:
- Adds missing spaces around quoted literals
- Adjusts the OCCURS clause to level 02 if it is at level 01
- Converts non-floating point literals to floating constant notations
- Fixes extra and misplaced periods
- Converts SET statements to MOVE when required by data types
- Converts "<>" to "NOT ="
- Replaces VALUES with VALUE
- Moves level 01 to Area A
- Replaces RECORD SEQUENTIAL with LINE SEQUENTIAL

Restrictions:
- Scu converts SET statements to MOVE only for the following data types:
  - COMP, COMP-4, or BINARY
  - COMP-3 or PACKED-DECIMAL
  - COMP-5
  - DISPLAY
  - NATIONAL (non-literal)
- Scu might incorrectly convert the SET statement to MOVE if the statement spans two or more lines.
- Scu replaces VALUES with VALUE only when VALUES is followed by a literal on the same line.
- Scu converts non-floating point literals to floating constant notations only when the literals and VALUE (or VALUES) are on the same line.
- Scu ignores the REPLACE statement and the REPLACING phrase of the COPY statement.

Tips:

- For more information about Area A and Area B, see *Reference format* in the *COBOL for AIX Language Reference*.
- Usually scu does initial transformation changes, and then fixes syntax and semantic errors (the **-N** option and copybooks are exceptions). However, if scu detects severe problems during transformation, such as non-COBOL standard special line, scu will generate error messages and skip the syntax and semantic phase. The **-N** option and copybook exceptions:
  - When **-N** is specified, scu does only the initial transformation changes.
  - Syntax and semantic errors in copybooks are fixed when these errors are fixed for the main source file with the **-G** option specified. For more information about processing copybooks with scu, see Scu and copybooks.

The output file contains compatible COBOL code that includes all fixes that scu can provide. If you do not specify the **-o** option for an output file name, the default output file is *filename*.scu.cbl, where *filename* is the original file name without the suffix. For example, the output file name for the source abc.def.cob is abc.def.scu.cbl.

scu issues return codes that indicate a success or failure of program conversion. See the return codes and corresponding explanations in the following table:

Table 1. Scu return codes

Return code	Explanation
0	To indicate that scu runs successfully.
1 - 4	Reserved for future use to indicate success.
5	To indicate a general failure.
6	To indicate a failure to open a copy file.

Attention: Scu converts source programs to a format that can be compiled with COBOL for AIX, but scu might not identify or fix all incompatibilities that exist in the code. IBM does not guarantee that the changes made by scu are error-free, or that the changes compile and run as you expect. You must verify the results that are produced by scu and make sure that the changes meet your expectations. You might also need to further modify the code that scu attempted to correct.
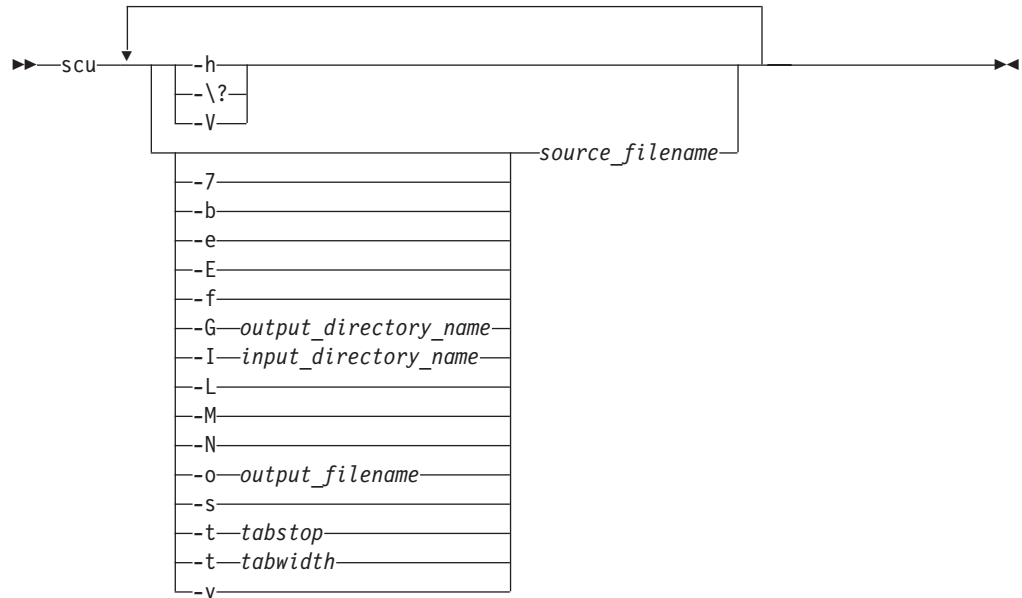
Source conversion utility (scu) options

Multiple options are available in the source conversion utility (scu) for source program conversion.

The scu command has the following syntax:

```
>>--scu--+--------+--+-------------------------------+--><
         +--h--+  |                                 |
         +--\?-+  +--source_filename--+
         +--V--+
         +--7------------------------+
         +--b------------------------+
         +--e------------------------+
         +--E------------------------+
         +--f------------------------+
         +--G--output_directory_name-+
         +--I--input_directory_name--+
         +--L------------------------+
         +--M------------------------+
         +--N------------------------+
         +--o--output_filename-------+
         +--s------------------------+
         +--t--tabstop---------------+
         +--t--tabwidth--------------+
         +--v------------------------+
```

Option descriptions:

-7 If a line starts with a special character, the **-7** option detects and moves the character to column 7 (the indicator area of fixed or extended format). The special character here can be an asterisk '*', slash '/', dollar sign '$', character 'D' followed by space and 'd' followed by space. The characters that follow the moved special character are handled depending on their positions:

- If the following characters are in column 2 - 7, the entire line is moved to the right until the special character is in column 7.
- If the following characters are in Area A or B, they remain where they are, unless there are characters in column 73 or beyond. When there are characters in column 73 or beyond, the characters might be moved left to the start of Area B.

Notes:

- For a dollar sign '$', scu issues an error that states manual intervention is required for this line.
- The special character '-' as the first character of a line is moved to column 7 only when you specify both the **-f** and **-7** options or when the **-f** option is specified and '-' is in column 1.
- For special characters that are not in column 7 or are not moved to column 7, scu handles these characters as regular (non-special) ones.

-b Removes trailing blanks.

-e Indicates whether an input file is in extended source format of a 252-character line. This option allows scu to distinguish the extended format from the default fixed format and covert the source code correctly.

-E Tells scu that the output (the converted source) is not limited to the default 72 columns (the fixed format). scu can extend the lines to the maximum length of 252 columns if necessary.

-f Identifies the input source as being in free format. By default the fixed (compatible) source format allows executable COBOL source code in Area

A (column 8 - 11), and Area B (column 12 - 72), with indicators in column 7. Optionally, if you specify **-e**, Area B is extended to column 252 for the input file. The **-f** option causes scu to move COBOL source code from column 1 - 6 to the indicator column, Area A, or Area B depending on the content of the source code to be moved.

The **-f** option handles free-format source lines that start with special characters in one of the following ways:

- If the special character is in column 1 (the indicator area of free format), the character is moved to column 7 (the indicator area of fixed format).
- If the special character is in column 2-11, it is moved to column 12 (the start column of Area B).

Notes:

- Special characters in a free-format source file can be '*', '/', '$', '-','D' followed by space and 'd' followed by space.
- By default the **-f** option is not specified, and a special character at the start of a free-format line is moved to column 12 (start column of Area B) only when it is in column 8-11 (Area A). When the special character is in other columns, it remains where it is. A character that is not a special character in column 7 is blanked out.
- When the **-f** option is used in combination with the **-7** option, any special character in column 1-6 is moved to column 7. This usage is similar to the **-7** option alone, but includes '-' as a special character.

-G<*copybook output directory name*>
Fixes COPY files and places them in the specified directory. For a COPY file that is qualified with a directory name, the directory name is kept as the subdirectory of the specified COPY file directory. If the **-G** option is not specified, only the main source file is fixed.

Note: Do not insert spaces between **-G** and <*copybook output directory name*>.

-h   Provides scu basic help with information about the available functions of scu. You can also specify **-\?** to display the same help information as **-h** does. For more detailed help, see the scu man page by running the command man scu.

-I<*copybook input directory name*>
Adds the specified path to the directories to be searched for copybooks if a library-name or SYSLIB is not specified.

Notes:

- This option is the uppercase letter I, not the lowercase letter l.
- Only a single path is allowed for each **-I** option. To add multiple paths, use multiple **-I** options.
- Do not insert spaces between **-I** and <*copybook input directory name*>.
- COPY files that are retrieved from an **-I** directory, fixed by scu and stored in the **-G** directory can then be picked up by specifying **-I** and the same **-G** directory. In this way, scu uses a fixed version of the copy file on subsequent runs against the same or different main source files.

-L   Indents level numbers other than 01 and 77 to Area B when the level numbers are in Area A.

-M   Issues a scu fix code (for example, SCU0001) at the end of each fixed line

and provides a short description and summary at the bottom of the output file. When standard compatible COBOL is input and the option **-M** is specified, a `scu` fix code is added to the unused noncompilable columns (starting at column 82) to indicate that the line is changed. A summary is also provided to display fix information that is associated with each fix code. The fix codes and summary are provided for syntax and semantic changes, not for the initial transformation changes. For example, when you specify **-f** to convert a file of free format to fixed 80 column or extended format, the line changes are made but you do not receive a `scu` fix code.

Use the fix code numbering to identify the level of needed attention for the message:

Table 2. Scu message severity levels

Fix code range	Severity	Description
SCU0001 - SCU1999	Informational	Scu expects that no further changes are needed for the fix.
SCU2000 - SCU3999	Warning	Scu expects that further changes might be needed. For instance, the fix of changing OCCURS from level 01 to level 02 might require further changes that are related to the fix.
SCU8000 - SCU8999	Error	Scu expects that further changes are required to complete the fix.
SCX0001 - SCX8999	Unfixed error	The problem is identified but `scu` is unable to fix the problem. The SCX*nnnn* error code corresponds to the matching SCU*nnnn* fix code.
SCX9000 - SCX9999	Ignored error	The problem is identified, but `scu` does not attempt to fix it.

Note: `Scu` might not identify or fix all incompatibilities that exist in the code.

The following list gives examples of `scu` fix codes and the corresponding fixed errors:

```
SCU0001 fix for IGYDS0001-W: Add missing space(s).
SCU0004 fix for IGYPS0019-W: Extra and misplaced periods in COBOL source. Scu removes the
extra periods.
SCU1002 fix for IGYGR1080-S: Non-floating point literal is assigned to floating point data
item. Scu converts it to floating point constant notation.
SCU1005 fix for IGYPS2024-S: SET used in place of MOVE. Scu converts SET stmt to MOVE stmt.
SCU1006 fix for IGYPS2094-S: "<>" converted to "NOT = ".
SCU1008 fix for IGYDS0017-E: "01" not in Area A. Scu moves 01 to Area A.
SCU3001 fix for IGYDS1063-E: OCCURS clause in level 01. Scu changes it to level 02 and adds a dummy 01.
SCU8001 fix for IGYDS0093-S: RECORD SEQUENTIAL not supported. Scu replaces RECORD
SEQUENTIAL with LINE SEQUENTIAL.
SCX9001 specified for an 02 level data item following an 01 level OCCURS that has been changed
to an 02 level OCCURS with fix code SCU3001
```

-N   Enables `scu` to do only the initial transformation changes without syntax and semantic changes, and forces the output to be written to the standard output.

-o *<output filename>*
        Specifies the output file name for the source file. The output file can be qualified with an existing directory. For example, the command `scu -o/dirname1/abc.modified.cbl abc.cbl` saves the output file `abc.modified.cbl` in the /dirname1 directory. By default the output file is saved in your current directory. If the **-o** option is not specified, the output file for the source file would be `abc.scu.cbl`.

-s   Removes the leading and trailing sequence numbers by blanking columns 1-6 and truncating the source line at column 73.

-t *<tabwidth>*
        Passes to `scu` the tab width that is used in the source code to ensure that the converted data is in correct columns. Tab characters that are encountered before a tab position are replaced by spaces sufficient to move the ensuing character to the tab position. The default tab width is 8.

-t *<tabstop>,...*
        Passes to `scu` the tab stops for conversion. Specify two or more tab stops separated by commas. Tab characters encountered past the last tab position are replaced by a single space character.

-v   Enables verbose output so that error and fix information is sent to `STDERR` during the source transformation, syntax and semantic checking, and fixing.

-V   Displays the version information of `scu`.

Copybooks and `scu`:

It is a good practice to have all copybooks go through transformation changes before `scu` attempts to fix syntax and semantic errors, because currently `scu` does not automatically perform transformation changes on copybooks. You can first run `scu` for your copybooks by specifying the **-N** option with any other transformation options, such as **-7**, **-b**, **-e**, **-E**, **-f**, **-L**, **-s**, and **-t**. Then, run `scu` for the main source files and specify **-I** with the copybook directory that contains the transformed copybooks for syntax and semantic error processing.

Notices

This information was developed for products and services offered in the U.S.A.

IBM may not offer the products, services, or features discussed in this document in other countries. Consult your local IBM representative for information on the products and services currently available in your area. Any reference to an IBM product, program, or service is not intended to state or imply that only that IBM product, program, or service may be used. Any functionally equivalent product, program, or service that does not infringe any IBM intellectual property right may be used instead. However, it is the user's responsibility to evaluate and verify the operation of any non-IBM product, program, or service.

IBM may have patents or pending patent applications covering subject matter described in this document. The furnishing of this document does not grant you any license to these patents. You can send license inquiries, in writing, to:

IBM Director of Licensing
IBM Corporation
North Castle Drive
Armonk, NY 10504-1785
U.S.A.

For license inquiries regarding double-byte (DBCS) information, contact the IBM Intellectual Property Department in your country or send inquiries, in writing, to:

IBM World Trade Asia Corporation
Licensing
2-31 Roppongi 3-chome, Minato-ku
Tokyo 106-0032, Japan

The following paragraph does not apply to the United Kingdom or any other country where such provisions are inconsistent with local law: INTERNATIONAL BUSINESS MACHINES CORPORATION PROVIDES THIS PUBLICATION "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Some states do not allow disclaimer of express or implied warranties in certain transactions, therefore, this statement may not apply to you.

This information could include technical inaccuracies or typographical errors. Changes are periodically made to the information herein; these changes will be incorporated in new editions of the publication. IBM may make improvements and/or changes in the product(s) and/or the program(s) described in this publication at any time without notice.

Any references in this information to non-IBM Web sites are provided for convenience only and do not in any manner serve as an endorsement of those Web sites. The materials at those Web sites are not part of the materials for this IBM product and use of those Web sites is at your own risk.

IBM may use or distribute any of the information you supply in any way it believes appropriate without incurring any obligation to you.

Licensees of this program who wish to have information about it for the purpose of enabling: (i) the exchange of information between independently created programs and other programs (including this one) and (ii) the mutual use of the information which has been exchanged, should contact:

IBM Corporation
J46A/G4
555 Bailey Avenue
San Jose, CA 95141-1003
U.S.A.

Such information may be available, subject to appropriate terms and conditions, including in some cases, payment of a fee.

The licensed program described in this information and all licensed material available for it are provided by IBM under terms of the IBM Customer Agreement, IBM International Program License Agreement, or any equivalent agreement between us.

Any performance data contained herein was determined in a controlled environment. Therefore, the results obtained in other operating environments may vary significantly. Some measurements may have been made on development-level systems and there is no guarantee that these measurements will be the same on generally available systems. Furthermore, some measurements may have been estimated through extrapolation. Actual results may vary. Users of this document should verify the applicable data for their specific environment.

Information concerning non-IBM products was obtained from the suppliers of those products, their published announcements or other publicly available sources. IBM has not tested those products and cannot confirm the accuracy of performance, compatibility or any other claims related to non-IBM products. Questions on the capabilities of non-IBM products should be addressed to the suppliers of those products.

All statements regarding IBM's future direction or intent are subject to change or withdrawal without notice, and represent goals and objectives only.

If you are viewing this information softcopy, the photographs and color illustrations may not appear.

Trademarks

IBM, the IBM logo, and ibm.com are trademarks or registered trademarks of International Business Machines Corp., registered in many jurisdictions worldwide. Other product and service names might be trademarks of IBM or other companies. A current list of IBM trademarks is available on the Web at "Copyright and trademark information" at www.ibm.com/legal/copytrade.shtml.

Other product and service names might be trademarks of IBM or other companies.