

ooRexx Documentation 4.2

Open Object Rexx™

Rexx Extensions Library Reference



W. David Ashley

Rony G. Flatscher

Mark Hessling

Rick McGuire

Lee Peedin

Oliver Sims

Jon Wolfers

ooRexx Documentation 4.2 Open Object Rexx™

Rexx Extensions Library Reference

Edition 1

Author	W. David Ashley
Author	Rony G. Flatscher
Author	Mark Hessling
Author	Rick McGuire
Author	Lee Peedin
Author	Oliver Sims
Author	Jon Wolfers

Copyright © 2005-2014 Rexx Language Association. All rights reserved.

Portions Copyright © 1995, 2004 IBM Corporation and others. All rights reserved.

This documentation and accompanying materials are made available under the terms of the Common Public License v1.0 which accompanies this distribution. A copy is also available as an appendix to this document and at the following address: <http://www.oorexx.org/license.html>.

Redistribution and use in source and binary forms, with or without modification, are permitted provided that the following conditions are met:

Redistributions of source code must retain the above copyright notice, this list of conditions and the following disclaimer. Redistributions in binary form must reproduce the above copyright notice, this list of conditions and the following disclaimer in the documentation and/or other materials provided with the distribution.

Neither the name of Rexx Language Association nor the names of its contributors may be used to endorse or promote products derived from this software without specific prior written permission.

THIS SOFTWARE IS PROVIDED BY THE COPYRIGHT HOLDERS AND CONTRIBUTORS "AS IS" AND ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT SHALL THE COPYRIGHT OWNER OR CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

Preface	v
1. Document Conventions	v
1.1. Typographic Conventions	v
1.2. Pull-quote Conventions	vi
1.3. Notes and Warnings	vii
2. How to Read the Syntax Diagrams	viii
3. Getting Help and Submitting Feedback	ix
3.1. The Open Object Rexx SourceForge Site	x
3.2. The Rexx Language Association Mailing List	xi
3.3. comp.lang.rexx Newsgroup	xi
4. Related Information	xi
1. csvStream Class	1
1.1. Translation of data involved in the csvStream class	1
1.2. Methods The csvStream Class defines	1
1.3. Attributes of the csvStream Class	1
1.4. Methods Inherited from the Stream Class	1
1.5. Methods inherited from the Object class	2
1.6. Methods	2
1.6.1. Close Method	2
1.6.2. CSVLineIn Method	2
1.6.3. CSVLineOut Method	3
1.6.4. GetHeaders Method	3
1.6.5. INIT Method	4
1.6.6. OPEN Method	4
1.6.7. SetHeaders Method	5
1.7. Attributes	5
1.7.1. DELIMETER Attribute	5
1.7.2. HEADERS Attribute	5
1.7.3. QUALIFIER Attribute	6
1.7.4. SKIPHEADERS Attribute	6
1.8. Examples	6
2. Host Emulator (HostEmu)	9
2.1. EXECIO subcommand	9
2.1.1. Command Options	10
2.2. HI subcommand	10
2.3. TE subcommand	11
2.4. TS subcommand	11
A. Notices	13
A.1. Trademarks	13
A.2. Source Code For This Document	14
B. Common Public License Version 1.0	15
B.1. Definitions	15
B.2. Grant of Rights	15
B.3. Requirements	16
B.4. Commercial Distribution	16
B.5. No Warranty	17
B.6. Disclaimer of Liability	17
B.7. General	17
C. Revision History	19
Index	21

Preface

This book describes a number of extension classes to Open Object Rexx.

This book is intended for people who plan to develop applications using Rexx and the extension classes. Its users range from the novice to experienced ooRexx users.

This book is a reference rather than a tutorial. It assumes you are already familiar with object-oriented programming concepts.

Descriptions include the use and syntax of the language and explain how the language processor "interprets" the language as a program is running.

1. Document Conventions

This manual uses several conventions to highlight certain words and phrases and draw attention to specific pieces of information.

In PDF and paper editions, this manual uses typefaces drawn from the [Liberation Fonts](https://fedorahosted.org/liberation-fonts/)¹ set. The Liberation Fonts set is also used in HTML editions if the set is installed on your system. If not, alternative but equivalent typefaces are displayed. Note: Red Hat Enterprise Linux 5 and later includes the Liberation Fonts set by default.

1.1. Typographic Conventions

Four typographic conventions are used to call attention to specific words and phrases. These conventions, and the circumstances they apply to, are as follows.

Mono-spaced Bold

Used to highlight system input, including shell commands, file names and paths. Also used to highlight keycaps and key combinations. For example:

To see the contents of the file **my_next_bestselling_novel** in your current working directory, enter the **cat my_next_bestselling_novel** command at the shell prompt and press **Enter** to execute the command.

The above includes a file name, a shell command and a keycap, all presented in mono-spaced bold and all distinguishable thanks to context.

Key combinations can be distinguished from keycaps by the hyphen connecting each part of a key combination. For example:

Press **Enter** to execute the command.

Press **Ctrl+Alt+F2** to switch to the first virtual terminal. Press **Ctrl+Alt+F1** to return to your X-Windows session.

The first paragraph highlights the particular keycap to press. The second highlights two key combinations (each a set of three keycaps with each set pressed simultaneously).

If source code is discussed, class names, methods, functions, variable names and returned values mentioned within a paragraph will be presented as above, in **mono-spaced bold**. For example:

¹ <https://fedorahosted.org/liberation-fonts/>

File-related classes include **filesystem** for file systems, **file** for files, and **dir** for directories. Each class has its own associated set of permissions.

Proportional Bold

This denotes words or phrases encountered on a system, including application names; dialog box text; labeled buttons; check-box and radio button labels; menu titles and sub-menu titles. For example:

Choose **System** → **Preferences** → **Mouse** from the main menu bar to launch **Mouse Preferences**. In the **Buttons** tab, click the **Left-handed mouse** check box and click **Close** to switch the primary mouse button from the left to the right (making the mouse suitable for use in the left hand).

To insert a special character into a **gedit** file, choose **Applications** → **Accessories** → **Character Map** from the main menu bar. Next, choose **Search** → **Find...** from the **Character Map** menu bar, type the name of the character in the **Search** field and click **Next**. The character you sought will be highlighted in the **Character Table**. Double-click this highlighted character to place it in the **Text to copy** field and then click the **Copy** button. Now switch back to your document and choose **Edit** → **Paste** from the **gedit** menu bar.

The above text includes application names; system-wide menu names and items; application-specific menu names; and buttons and text found within a GUI interface, all presented in proportional bold and all distinguishable by context.

Mono-spaced Bold Italic or *Proportional Bold Italic*

Whether mono-spaced bold or proportional bold, the addition of italics indicates replaceable or variable text. Italics denotes text you do not input literally or displayed text that changes depending on circumstance. For example:

To connect to a remote machine using ssh, type **ssh *username@domain.name*** at a shell prompt. If the remote machine is **example.com** and your username on that machine is john, type **ssh *john@example.com***.

The **mount -o remount *file-system*** command remounts the named file system. For example, to remount the **/home** file system, the command is **mount -o remount */home***.

To see the version of a currently installed package, use the **rpm -q *package*** command. It will return a result as follows: ***package-version-release***.

Note the words in bold italics above — *username*, *domain.name*, *file-system*, *package*, *version* and *release*. Each word is a placeholder, either for text you enter when issuing a command or for text displayed by the system.

Aside from standard usage for presenting the title of a work, italics denotes the first use of a new and important term. For example:

Publican is a *DocBook* publishing system.

1.2. Pull-quote Conventions

Terminal output and source code listings are set off visually from the surrounding text.

Output sent to a terminal is set in **mono-spaced roman** and presented thus:

```
books      Desktop  documentation  drafts  mss    photos  stuff  svn
books_tests Desktop1  downloads     images  notes  scripts svgs
```

Source-code listings are also set in **mono-spaced roman** but add syntax highlighting as follows:

```
package org.jboss.book.jca.ex1;

import javax.naming.InitialContext;

public class ExClient
{
    public static void main(String args[])
        throws Exception
    {
        InitialContext iniCtx = new InitialContext();
        Object          ref    = iniCtx.lookup("EchoBean");
        EchoHome        home   = (EchoHome) ref;
        Echo             echo   = home.create();

        System.out.println("Created Echo");

        System.out.println("Echo.echo('Hello') = " + echo.echo("Hello"));
    }
}
```

1.3. Notes and Warnings

Finally, we use three visual styles to draw attention to information that might otherwise be overlooked.



Note

Notes are tips, shortcuts or alternative approaches to the task at hand. Ignoring a note should have no negative consequences, but you might miss out on a trick that makes your life easier.



Important

Important boxes detail things that are easily missed: configuration changes that only apply to the current session, or services that need restarting before an update will apply. Ignoring a box labeled 'Important' will not cause data loss but may cause irritation and frustration.



Warning

Warnings should not be ignored. Ignoring warnings will most likely cause data loss.

2. How to Read the Syntax Diagrams

Throughout this book, syntax is described using the structure defined below.

- Read the syntax diagrams from left to right, from top to bottom, following the path of the line.

The `>>-` symbol indicates the beginning of a statement.

The `->` symbol indicates that the statement syntax is continued on the next line.

The `->` symbol indicates that a statement is continued from the previous line.

The `-><` symbol indicates the end of a statement.

Diagrams of syntactical units other than complete statements start with the `>-` symbol and end with the `->` symbol.

- Required items appear on the horizontal line (the main path).

```
>>-STATEMENT--required_item-----><
```

- Optional items appear below the main path.

```
>>-STATEMENT--+-+-----+-----><
               +-optional_item-+
```

- If you can choose from two or more items, they appear vertically, in a stack. If you must choose one of the items, one item of the stack appears on the main path.

```
>>-STATEMENT--+-required_choice1-+-+-----+-----><
               +-required_choice2-+
```

- If choosing one of the items is optional, the entire stack appears below the main path.

```
>>-STATEMENT--+-+-----+-----><
               +-optional_choice1-+
               +-optional_choice2-+
```

- If one of the items is the default, it appears above the main path and the remaining choices are shown below.

```
               +-default_choice--+
>>-STATEMENT--+-+-----+-----><
               +-optional_choice-+
```



```
+--optional_choice--+
```

- An arrow returning to the left above the main line indicates an item that can be repeated.

```

      +-----+
      v       |
>>-STATEMENT---repeatable_item-+-----><

```

A repeat arrow above a stack indicates that you can repeat the items in the stack.

- A set of vertical bars around an item indicates that the item is a fragment, a part of the syntax diagram that appears in greater detail below the main diagram.

```
>>-STATEMENT--| fragment |-----><
```

fragment:

```
|--expansion_provides_greater_detail-----|
```

- Keywords appear in uppercase (for example, **PARM1**). They must be spelled exactly as shown but you can type them in upper, lower, or mixed case. Variables appear in all lowercase letters (for example, **parmx**). They represent user-supplied names or values.
- If punctuation marks, parentheses, arithmetic operators, or such symbols are shown, you must enter them as part of the syntax.

The following example shows how the syntax is described:

```

      +-,-----+
      v       |
>>-MAX(---number-+---)-----><

```

3. Getting Help and Submitting Feedback

The Open Object Rexx Project has a number of methods to obtain help and submit feedback for ooRexx and the extension packages that are part of ooRexx. These methods, in no particular order of preference, are listed below.

3.1. The Open Object Rexx SourceForge Site

The *Open Object Rexx Project*² utilizes *SourceForge*³ to house the *ooRexx Project*⁴ source repositories, mailing lists and other project features. Over time it has become apparent that the Developer and User mailing lists are better tools for carrying on discussions concerning ooRexx and that the Forums provided by SourceForge are cumbersome to use. The ooRexx user is most likely to get timely replies from one of the mailing lists.

Here is a list of some of the most useful facilities provided by SourceForge.

The Developer Mailing List

You can subscribe to the oorexx-devel mailing list at [ooRexx Mailing List Subscriptions](#)⁵ page. This list is for discussing ooRexx project development activities and future interpreter enhancements. It also supports a historical archive of past messages.

The Users Mailing List

You can subscribe to the oorexx-users mailing list at [ooRexx Mailing List Subscriptions](#)⁶ page. This list is for discussing using ooRexx. It also supports a historical archive of past messages.

The Announcements Mailing List

You can subscribe to the oorexx-announce mailing list at [ooRexx Mailing List Subscriptions](#)⁷ page. This list is only used to announce significant ooRexx project events.

The Bug Mailing List

You can subscribe to the oorexx-bugs mailing list at [ooRexx Mailing List Subscriptions](#)⁸ page. This list is only used for monitoring changes to the ooRexx bug tracking system.

Bug Reports

You can create a bug report at [ooRexx Bug Report](#)⁹ page. Please try to provide as much information in the bug report as possible so that the developers can determine the problem as quickly as possible. Sample programs that can reproduce your problem will make it easier to debug reported problems.

Documentation Feedback

You can submit feedback for, or report errors in, the documentation at [ooRexx Documentation Report](#)¹⁰ page. Please try to provide as much information in a documentation report as possible. In addition to listing the document and section the report concerns, direct quotes of the text will help the developers locate the text in the source code for the document. (Section numbers are generated when the document is produced and are not available in the source code itself.) Suggestions as to how to reword or fix the existing text should also be included.

Request For Enhancement

You can suggest ooRexx features at the [ooRexx Feature Requests](#)¹¹ page.

² <http://www.oorexx.org/>

³ <http://sourceforge.net/>

⁴ <http://sourceforge.net/projects/ooorexx>

⁵ http://sourceforge.net/mail/?group_id=119701

⁶ http://sourceforge.net/mail/?group_id=119701

⁷ http://sourceforge.net/mail/?group_id=119701

⁸ http://sourceforge.net/mail/?group_id=119701

⁹ http://sourceforge.net/tracker/?group_id=119701&atid=684730

¹⁰ http://sourceforge.net/tracker/?group_id=119701&atid=1001880

¹¹ http://sourceforge.net/tracker/?group_id=119701&atid=684733

Patch Reports

If you create an enhancement patch for ooRexx please post the patch using the [ooRexx Patch Report](#)¹² page. Please provide as much information in the patch report as possible so that the developers can evaluate the enhancement as quickly as possible.

Please do not post bug fix patches here, instead you should open a bug report and attach the patch to it.

The ooRexx Forums

The ooRexx project maintains a set of forums that anyone may contribute to or monitor. They are located on the [ooRexx Forums](#)¹³ page. There are currently three forums available: Help, Developers and Open Discussion. In addition, you can monitor the forums via email.

3.2. The Rexx Language Association Mailing List

The [Rexx Language Association](#)¹⁴ maintains a mailing list for its members. This mailing list is only available to RexxLA members thus you will need to join RexxLA in order to get on the list. The dues for RexxLA membership are small and are charged on a yearly basis. For details on joining RexxLA please refer to the [RexxLA Home Page](#)¹⁵ or the [RexxLA Membership Application](#)¹⁶ page.

3.3. comp.lang.rexx Newsgroup

The [comp.lang.rexx](#)¹⁷ newsgroup is a good place to obtain help from many individuals within the Rexx community. You can obtain help on Open Object Rexx or on any number of other Rexx interpreters and tools.

4. Related Information

See also: *Open Object Rexx: Reference*

¹² http://sourceforge.net/tracker/?group_id=119701&atid=684732

¹³ http://sourceforge.net/forum/?group_id=119701

¹⁴ <http://www.rexxla.org/>

¹⁵ <http://rexxla.org/>

¹⁶ <http://www.rexxla.org/rexxla/join.html>

¹⁷ <http://groups.google.com/group/comp.lang.rexx/topics?hl=en>

csvStream Class

The csvStream class extends the Stream class to read & write CSV files directly to Collection Objects.

The csvStream Class is a subclass of the Stream Class.

1.1. Translation of data involved in the csvStream class

CSV file literals are surrounded by quotes `""`. These are removed by `CSVLineIn` and inserted by `CSVLineOut`. Quotes within CSV data are represented self escaped ie: `"` appears as `""`. These are translated by the `CSVLineIn` and `CSVLineOut` methods. `CSVLineOut` encapsulates non-numeric fields in `""` unless they already are. CSV literal strings can contain line-end sequences. To create multi-line fields use the line-end character provided by the operating system dependant ooRexx local variable `.endofline`.

1.2. Methods The csvStream Class defines

`CLOSE` (overrides stream class method)
`CSVLINEIN`
`CSVLINEOUT`
`GETHEADERS`
`SETHEADERS`
`INIT` (overrides stream class method)
`OPEN` (overrides stream class method)
`STATE` (overrides stream class method)
`DESCRIPTION` (overrides stream class method)

1.3. Attributes of the csvStream Class

`HEADERS~FIELD(n)~NAME`
`HEADERS~FIELD(n)~LITERAL`
`SKIPHEADERS`
`DELIMITER`
`QUALIFIER`
`STRIPOPTION`
`STRIPCHAR`

1.4. Methods Inherited from the Stream Class

`ARRAYIN`
`ARRAYOUT`
`CHARIN`
`CHAROUT`
`CHARS`
`COMMAND`
`DESCRIPTION`
`FLUSH`
`LINEIN`
`LINEOUT`
`LINES`

MAKEARRAY
POSITION
QUALIFY
QUERY
SAY
SEEK
STATE
SUPPLIER

1.5. Methods inherited from the Object class

NEW (Class method)
Operator methods: =, ==, !=, >, <, >=, <=
CLASS
COPY
DEFAULTNAME>
HASMETHOD
OBJECTNAME
OBJECTNAME=
REQUEST
RUN
SETMETHOD
START
STRING
UNSETMETHOD



Note

The Stream class also has available class methods that its metaclass, the Class class, defines.

1.6. Methods

1.6.1. Close Method

```
>>-CLOSE-----><
```

Closes the stream that receives the message. CLOSE returns READY: if closing the stream is successful, or an appropriate error message. If you have tried to close an unopened file, then the CLOSE method returns a null string (""). If you specified headersExist when you created this instance then the headers will be updated to the stream at this point if they have been changed.

1.6.2. CSVLineIn Method

```
>>-CSVLINEIN-----><
```

Reads and returns a row of CSV data from the stream. Note that a row of data may be stored in more than one logical line of the stream. An array is returned, the nth element of which contains the nth field from the Row.

Two other attributes exist after performing a CSVLineIn

Rawdata is a String Object containing the raw text that the row consists of.

Values is a Table Object mapping field data onto field-names. This is only available if headersExist is specified on the init method.

Badly formed CSV data. Where the data read in by CSVLineIn is not well formed CSV data the results are unpredictable. The class can detect some errors in the incoming data, and where such an error is detected the STATE method will return ERROR and the DESCRIPTION method will give extra error information. Where the provenance of the data is outside your control it would be well to check the STATE after every CSVLineIn. Subsequent calls to CSVLineIn may be able to recover and return subsequent rows from the file but this should not be expected to be the norm. Subsequent calls to CSVLineIn after an error will not return the STATE to READY. It will remain at ERROR until the Stream class resets it (ie: when you close the CSVStream)

1.6.3. CSVLineOut Method

```
>>-CSVLINEOUT-(-collection-Object-)-----><
```

Writes a row of CSV data to a stream. Note that a row of data may be stored in more than one logical line of the stream. If the stream was instantiated with headersExist as .true then the collection-object may be a directory, table or stem object mapping headers onto CSV fields. Otherwise the collection-object must be an array or a collection with a makeArray method and the nth element of the collection will be placed in the nth field of the CSV file. Any occurrences of the Nil Object are stored as null strings in the file.



Note

If the collection object is a Stem then a tail of 0 is ignored as by convention the 0 tail stores the number of tails on the stem.

1.6.4. GetHeaders Method

```
>>-GETHEADERS-----><
```

Returns a csvStreamHeader object.

Get headers will return a csvStreamHeader object containing details of the column header names and whether they are literal values or not. Column header names that exist before the csvStream is opened are present as soon as the file is opened, but literal information will not be present till the first CSVLineIn or CSVLineOut is issued.

1.6.5. INIT Method

```
>>-INIT(name+-----+)-><
      +-,-HeadersExist-+
```

Initializes a stream object for a stream named name, but does not open the stream.

The second optional parameter if passed a value of 'H' (or .true) indicates that the first row of the stream is (or is to be) a row of headers containing the names of the CSV fields. Note that header fields are case sensitive. This means that 'name' and 'Name' and 'NAME' will all be treated as separate columns.

1.6.6. OPEN Method

Parameters are as the Stream class Open Method

Opens the stream to which you send the message and returns READY:. If the method is unsuccessful, it returns an error message string in the same form that the DESCRIPTION method uses. See the Stream Class Open Method for a fuller description.

1.6.6.1. Changing the behaviour of a csvStream object

Before issuing the Open message, you can affect the csvStream's behaviour by setting the attribute skipHeaders to .false. This will mean that the first row returned by CSVLineIn on a csvStream where headers exist is the header row, rather than the default behaviour which is to return the first row of data.

After issuing the OPEN message to a csvStream which has been opened with headers exist, the class will attempt to learn the nature of the fields by analysing the data. You can teach it by setting the headers field attributes name and literal. For instance:

Example 1.1. Describing header fields

```
/* set the name of the second field to 'Height' */
MyCsvStream~headers~field(2)~name='Height'

/* tell the stream to treat the
third column as literal data rather than numeric */
MyCsvStream~headers~field(3)~literal= .true
```

By default the delimiter csvStream expects is a comma (after all CSV stands for Comma Separated Variables) and literals are qualified by a double inverted comma. However you can create and

read files with other delimiters or qualifiers by changing the attributes delimiter and qualifier after instantiating A csvStream object. For instance, to use ; as a delimiter and ' as a qualifier do the following:

Example 1.2. Describing field delimiters

```
MyCsvStream = .csvStream~new
MyCsvStream~delimiter=";"
MyCsvStream~qualifier="'"
```

If the attribute StripOption is set to 'L', 'T' or 'B' then data is stripped using that option before CSVLineIn inserts it in the returned array. The default of 'N' means no stripping is performed. One can specify which character to strip using the attribute stripChar which defaults to blank.

Example 1.3. Setting the strip option

```
MyCsvStream~StripOption = 'T' /* strip trailing blanks */
```

or

Example 1.4. Removing leading zeros

```
MyCsvStream~StripOption = 'L'
MyCsvStream~stripChar = '0' /* strip Leading zeroes */
```

1.6.7. SetHeaders Method

```
>>> SETHEADERS(headerobj) -----><
```

Passed a csvStreamHeader object will apply it to the csvStream. Together with Get Headers this allows you to base one CSV file on another.

1.7. Attributes

1.7.1. DELIMETER Attribute

This is the character which delimits the fields (as long as it does not appear within a literal). In a standard CSV file it is a comma ,. See Changing the behaviour of a csvStream object under the OPEN method for an example of changing the delimiter.

1.7.2. HEADERS Attribute

Access is available to the Field definition table for files with headers. There are two entries, NAME & LITERAL. NAME is the Name for that particular column. If LITERAL is .true then that column will be treated as a literal even if the data in it is numeric. If any entry in a column is non-numeric then the entire column is treated as a literal. See Changing the behaviour of a csvStream object under the OPEN method for an example of accessing the table.

1.7.3. QUALIFIER Attribute

The Qualifier is the character that surrounds literal fields. Delimiters that appear within literal fields are ignored. In a standard CSV file the qualifier is a double quotation mark ("). See Changing the behaviour of a csvStream object under the OPEN method for an example of changing the qualifier.

1.7.4. SKIPHEADERS Attribute

See *Changing the behaviour of a csvStream object* under the OPEN method.

1.8. Examples

Example 1.5. Files without headers

```
csv = .csvStream-new('c:\MyData.csv') /* 2nd arg defaults to no headers */
/* csv-skipHeaders = .false           UnNoOp to return header line */

csv-open('write')                      /*=File looks like this=*/
csv-CSVLineOut(.array-of('red','stop')) /* "red","stop"          */
csv-CSVLineOut(.array-of('green','go')) /* "green","go"           */
csv-close                             /*=====*/

csv-open('read')                      /*=====Returns=====*/
do while csv-chars > 0                /* New record            */
  dataArr = csv-CSVLineIn              /* field 1: red           */
  say 'New record'                    /* field 2: stop          */
  do I = 1 to dataArr-last            /* New record            */
    say 'field' I ':' dataArr[I]      /* field 1: green         */
  end                                  /* field 2: go            */
end                                    /*=====*/
csv-close

::requires 'csvstream.cls'
</programlisting>
<para>
Files with headers:
</para>
<programlisting>
csv = .csvStream-new('c:\headered.csv',.true)
csv-open /* Stream class defaults to both ie:readWrite */
myTable = .table-new
myTable-put('red','colour')
myTable-put('stop','action')
csv-CSVLineout(myTable)
myTable-put('green','colour')
myTable-put('go','action')
csv-CSVLineout(myTable)
csv-close
```

```

Csv~open('read')                                /*=====Returns=====*/
Do while csv~chars > 0                          /* new record          */
  Csv~csvLineIn                                /* colour: red         */
  Say 'new record'                             /* action: stop        */
  Do field over csv~values                     /* new record          */
    Say field':' csv~values~at(field) /* colour: green       */
  End                                           /* action: go          */
End                                           /*=====*/
csv~close

::requires 'csvstream.cls'
</programlisting>
<para>
Example with error checking
</para>
<programlisting>
csv = .csvStream~new('c:\BadData.csv')

csv~open('read')
if csv~state = 'READY'
then do
  do while csv~chars > 0
    dataArr = csv~CSVLineIn
    if csv~state = 'ERROR'
    then do
      say 'BAD DATA IN CSV FILE -' csv~description
      leave
    end
    say 'New record'
    do I = 1 to dataArr~last
      say 'field' I ':' dataArr[I]
    end
  end
end
csv~close
end
else say 'COULD NOT OPEN CSV FILE -' csv~description

::requires 'csvstream.cls'

```


Host Emulator (HostEmu)

HostEmu is a subcommand environment that partially emulates a TSO/CMS environment. It provides a small subset of commands available in those environments which make the transition from a real host Rexx programming environment to a Linux/Windows ooRexx environment much easier. The following subcommands are available:

EXECIO

an I/O mechanism.

HI

halts the current Rexx program.

TE

deactivate the Rexx trace mechanism.

TS

activate the Rexx trace mechanism.

The HostEmu HI, TS, TE commands have no arguments that are acceptable in the HostEmu environment. Thus their syntax is very simple. The EXECIO subcommand is more complicated and requires some explanation. It is a simplified version of the mainframe command but will provide most of the functionality you will need on a daily basis.

To include and use the HostEmu subcommand environment you must place a ooRexx directive in your script. The following shows how to accomplish this.

```
::requires "hostemu" LIBRARY
```

This will activate the environment. The subcommand name is "HostEmu" (the case of this string is not important). You can send commands to this environment via the ooRexx address statement. Here is an example.

```
address hostemu 'execio * diskf "./inputfile.txt" (finis stem in.'
```

Note that the file name **MUST** be placed within a set of quotation marks.

The example above should look very familiar to a mainframe Rexx programmer. The big difference is that a real file name is used instead of a DDNAME and the HostEmu environment is not the default address environment, thus the requirement that you either include the 'HostEmu' environment name in the address statement or you make the 'HostEmu' environment the default environment.

2.1. EXECIO subcommand

```
>>--EXECIO--+-num-----DISKR--+"filename"--(-----FINIS STEM stemname.-----><
          +--*-----+  +--DISKW--+          +--STEM stemname. FINIS--+
                                          +--STEM stemname.-----+
                                          +--FINIS-----LIFO-----+
                                          +--FIFO--+
                                          +--SKIP--+
```

2.1.1. Command Options

num

Specifies the number of records (text lines) to read or write.

*

Specifies that all remaining records are to be read or written.

DISKR

The operation is a disk read operation.

DISKW

The operation is a disk write operation.

filename

The name of the file for the disk operation. This option MUST be enclosed in double quotes.

FINIS

The file will be closed at the end of the operation.

STEM stemname.

The operation works against the specified stem. A trailing period is required or the name will be used as the root of a standard Rexx variable name.

LIFO

Specifies that instead of a Rexx stem the Rexx SESSION queue should be used. The queue will be read or written to using LIFO.

FIFO

Specifies that instead of a Rexx stem the Rexx SESSION queue should be used. The queue will be read or written to using FIFO.

SKIP

Specifies the number of records (text lines) to be skipped. No stem or queue operations will be performed in this case.

Note that the LIFO, FIFO and SKIP options are not valid for DISKW operations.

These options should provide almost all of the EXECIO operations you will need in the non-mainframe operating system environment.

2.2. HI subcommand

```
>>--HI-----><
```

Halts the current Rexx program.

2.3. TE subcommand

```
>>--TE-----<<
```

Deactivate the Rexx trace mechanism.

2.4. TS subcommand

```
>>--TS-----<<
```

Activate the Rexx trace mechanism.

Appendix A. Notices

Any reference to a non-open source product, program, or service is not intended to state or imply that only non-open source product, program, or service may be used. Any functionally equivalent product, program, or service that does not infringe any Rexx Language Association (RexxLA) intellectual property right may be used instead. However, it is the user's responsibility to evaluate and verify the operation of any non-open source product, program, or service.

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

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

This information contains examples of data and reports used in daily business operations. To illustrate them as completely as possible, the examples include the names of individuals, companies, brands, and products. All of these names are fictitious and any similarity to the names and addresses used by an actual business enterprise is entirely coincidental.

A.1. Trademarks

Open Object Rexx™ and ooRexx™ are trademarks of the Rexx Language Association.

The following terms are trademarks of the IBM Corporation in the United States, other countries, or both:

1-2-3
AIX
IBM
Lotus
OS/2
S/390
VisualAge

AMD is a trademark of Advance Micro Devices, Inc.

Intel, Intel Inside (logos), MMX and Pentium are trademarks of Intel Corporation in the United States, other countries, or both.

Java and all Java-based trademarks are trademarks of Sun Microsystems, Inc. in the United States, other countries, or both.

Linux is a trademark of Linus Torvalds in the United States, other countries, or both.

Microsoft, Windows, Windows NT, and the Windows logo are trademarks of Microsoft Corporation in the United States, other countries, or both.

UNIX is a registered trademark of The Open Group in the United States and other countries.

Other company, product, or service names may be trademarks or service marks of others.

A.2. Source Code For This Document

The source code for this document is available under the terms of the Common Public License v1.0 which accompanies this distribution and is available in the appendix [Appendix B, Common Public License Version 1.0](#). The source code itself is available at http://sourceforge.net/project/showfiles.php?group_id=119701.

The source code for this document is maintained in DocBook SGML/XML format.



Appendix B. Common Public License

Version 1.0

THE ACCOMPANYING PROGRAM IS PROVIDED UNDER THE TERMS OF THIS COMMON PUBLIC LICENSE ("AGREEMENT"). ANY USE, REPRODUCTION OR DISTRIBUTION OF THE PROGRAM CONSTITUTES RECIPIENT'S ACCEPTANCE OF THIS AGREEMENT.

B.1. Definitions

"Contribution" means:

1. in the case of the initial Contributor, the initial code and documentation distributed under this Agreement, and
2. in the case of each subsequent Contributor:
 - a. changes to the Program, and
 - b. additions to the Program;

where such changes and/or additions to the Program originate from and are distributed by that particular Contributor. A Contribution 'originates' from a Contributor if it was added to the Program by such Contributor itself or anyone acting on such Contributor's behalf. Contributions do not include additions to the Program which: (i) are separate modules of software distributed in conjunction with the Program under their own license agreement, and (ii) are not derivative works of the Program.

"Contributor" means any person or entity that distributes the Program.

"Licensed Patents " mean patent claims licensable by a Contributor which are necessarily infringed by the use or sale of its Contribution alone or when combined with the Program.

"Program" means the Contributions distributed in accordance with this Agreement.

"Recipient" means anyone who receives the Program under this Agreement, including all Contributors.

B.2. Grant of Rights

1. Subject to the terms of this Agreement, each Contributor hereby grants Recipient a non-exclusive, worldwide, royalty-free copyright license to reproduce, prepare derivative works of, publicly display, publicly perform, distribute and sublicense the Contribution of such Contributor, if any, and such derivative works, in source code and object code form.
2. Subject to the terms of this Agreement, each Contributor hereby grants Recipient a non-exclusive, worldwide, royalty-free patent license under Licensed Patents to make, use, sell, offer to sell, import and otherwise transfer the Contribution of such Contributor, if any, in source code and object code form. This patent license shall apply to the combination of the Contribution and the Program if, at the time the Contribution is added by the Contributor, such addition of the Contribution causes such combination to be covered by the Licensed Patents. The patent license shall not apply to any other combinations which include the Contribution. No hardware per se is licensed hereunder.
3. Recipient understands that although each Contributor grants the licenses to its Contributions set forth herein, no assurances are provided by any Contributor that the Program does not infringe the patent or other intellectual property rights of any other entity. Each Contributor disclaims any liability to Recipient for claims brought by any other entity based on infringement

of intellectual property rights or otherwise. As a condition to exercising the rights and licenses granted hereunder, each Recipient hereby assumes sole responsibility to secure any other intellectual property rights needed, if any. For example, if a third party patent license is required to allow Recipient to distribute the Program, it is Recipient's responsibility to acquire that license before distributing the Program.

4. Each Contributor represents that to its knowledge it has sufficient copyright rights in its Contribution, if any, to grant the copyright license set forth in this Agreement.

B.3. Requirements

A Contributor may choose to distribute the Program in object code form under its own license agreement, provided that:

1. it complies with the terms and conditions of this Agreement; and
2. its license agreement:
 - a. effectively disclaims on behalf of all Contributors all warranties and conditions, express and implied, including warranties or conditions of title and non-infringement, and implied warranties or conditions of merchantability and fitness for a particular purpose;
 - b. effectively excludes on behalf of all Contributors all liability for damages, including direct, indirect, special, incidental and consequential damages, such as lost profits;
 - c. states that any provisions which differ from this Agreement are offered by that Contributor alone and not by any other party; and
 - d. states that source code for the Program is available from such Contributor, and informs licensees how to obtain it in a reasonable manner on or through a medium customarily used for software exchange.

When the Program is made available in source code form:

1. it must be made available under this Agreement; and
2. a copy of this Agreement must be included with each copy of the Program.

Contributors may not remove or alter any copyright notices contained within the Program.

Each Contributor must identify itself as the originator of its Contribution, if any, in a manner that reasonably allows subsequent Recipients to identify the originator of the Contribution.

B.4. Commercial Distribution

Commercial distributors of software may accept certain responsibilities with respect to end users, business partners and the like. While this license is intended to facilitate the commercial use of the Program, the Contributor who includes the Program in a commercial product offering should do so in a manner which does not create potential liability for other Contributors. Therefore, if a Contributor includes the Program in a commercial product offering, such Contributor ("Commercial Contributor") hereby agrees to defend and indemnify every other Contributor ("Indemnified Contributor") against any losses, damages and costs (collectively "Losses") arising from claims, lawsuits and other legal actions brought by a third party against the Indemnified Contributor to the extent caused by the acts or omissions of such Commercial Contributor in connection with its distribution of the Program in a commercial product offering. The obligations in this section do not apply to any claims or Losses relating to any actual or alleged intellectual property infringement. In order to qualify, an Indemnified

Contributor must: a) promptly notify the Commercial Contributor in writing of such claim, and b) allow the Commercial Contributor to control, and cooperate with the Commercial Contributor in, the defense and any related settlement negotiations. The Indemnified Contributor may participate in any such claim at its own expense.

For example, a Contributor might include the Program in a commercial product offering, Product X. That Contributor is then a Commercial Contributor. If that Commercial Contributor then makes performance claims, or offers warranties related to Product X, those performance claims and warranties are such Commercial Contributor's responsibility alone. Under this section, the Commercial Contributor would have to defend claims against the other Contributors related to those performance claims and warranties, and if a court requires any other Contributor to pay any damages as a result, the Commercial Contributor must pay those damages.

B.5. No Warranty

EXCEPT AS EXPRESSLY SET FORTH IN THIS AGREEMENT, THE PROGRAM IS PROVIDED ON AN "AS IS" BASIS, WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, EITHER EXPRESS OR IMPLIED INCLUDING, WITHOUT LIMITATION, ANY WARRANTIES OR CONDITIONS OF TITLE, NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Each Recipient is solely responsible for determining the appropriateness of using and distributing the Program and assumes all risks associated with its exercise of rights under this Agreement, including but not limited to the risks and costs of program errors, compliance with applicable laws, damage to or loss of data, programs or equipment, and unavailability or interruption of operations.

B.6. Disclaimer of Liability

EXCEPT AS EXPRESSLY SET FORTH IN THIS AGREEMENT, NEITHER RECIPIENT NOR ANY CONTRIBUTORS SHALL HAVE ANY LIABILITY FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING WITHOUT LIMITATION LOST PROFITS), HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OR DISTRIBUTION OF THE PROGRAM OR THE EXERCISE OF ANY RIGHTS GRANTED HEREUNDER, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

B.7. General

If any provision of this Agreement is invalid or unenforceable under applicable law, it shall not affect the validity or enforceability of the remainder of the terms of this Agreement, and without further action by the parties hereto, such provision shall be reformed to the minimum extent necessary to make such provision valid and enforceable.

If Recipient institutes patent litigation against a Contributor with respect to a patent applicable to software (including a cross-claim or counterclaim in a lawsuit), then any patent licenses granted by that Contributor to such Recipient under this Agreement shall terminate as of the date such litigation is filed. In addition, if Recipient institutes patent litigation against any entity (including a cross-claim or counterclaim in a lawsuit) alleging that the Program itself (excluding combinations of the Program with other software or hardware) infringes such Recipient's patent(s), then such Recipient's rights granted under Section 2(b) shall terminate as of the date such litigation is filed.

All Recipient's rights under this Agreement shall terminate if it fails to comply with any of the material terms or conditions of this Agreement and does not cure such failure in a reasonable period of time after becoming aware of such noncompliance. If all Recipient's rights under this Agreement terminate, Recipient agrees to cease use and distribution of the Program as soon as reasonably practicable.

However, Recipient's obligations under this Agreement and any licenses granted by Recipient relating to the Program shall continue and survive.

Everyone is permitted to copy and distribute copies of this Agreement, but in order to avoid inconsistency the Agreement is copyrighted and may only be modified in the following manner. The Agreement Steward reserves the right to publish new versions (including revisions) of this Agreement from time to time. No one other than the Agreement Steward has the right to modify this Agreement. IBM is the initial Agreement Steward. IBM may assign the responsibility to serve as the Agreement Steward to a suitable separate entity. Each new version of the Agreement will be given a distinguishing version number. The Program (including Contributions) may always be distributed subject to the version of the Agreement under which it was received. In addition, after a new version of the Agreement is published, Contributor may elect to distribute the Program (including its Contributions) under the new version. Except as expressly stated in Sections 2(a) and 2(b) above, Recipient receives no rights or licenses to the intellectual property of any Contributor under this Agreement, whether expressly, by implication, estoppel or otherwise. All rights in the Program not expressly granted under this Agreement are reserved.

This Agreement is governed by the laws of the State of New York and the intellectual property laws of the United States of America. No party to this Agreement will bring a legal action under this Agreement more than one year after the cause of action arose. Each party waives its rights to a jury trial in any resulting litigation.

Appendix C. Revision History

Revision 0-0 Tue Aug 7 2012

David Ashley

Initial creation of book by publican

Index

C

- CLOSE method
 - scvStream, 2
- Common Public License, 15
- CPL, 15
- CSVLINEIN method
 - scvStream, 2
- CSVLINEOUT method
 - scvStream, 3
- scvStream
 - Attributes, 1
 - CLOSE method, 2
 - CSVLINEIN method, 2
 - CSVLINEOUT method, 3
 - DELIMITER attribute, 5
 - Example code, 6
 - GETHEADERS method, 3
 - HEADERS attribute, 5
 - Inherited methods, 1, 2
 - INIT method, 4
 - Methods, 1, 2
 - OPEN method, 4
 - QUALIFIER attribute, 6
 - SETHEADERS method, 5
 - SKIPHEADERS attribute, 6

D

- DELIMITER attribute
 - scvStream, 5

E

- EXECIO subcommand
 - hostemu, 9

G

- GETHEADERS method
 - scvStream, 3

H

- HEADERS attribute
 - scvStream, 5
- HI subcommand
 - hostemu, 10
- HostEmu subcommands
 - EXECIO, 9
 - HI, 10
 - TE, 11
 - TS, 11

I

- INIT method
 - scvStream, 4

L

- License, Common Public, 15
- License, Open Object Rexx, 15

M

- Methods, csvStream, 1

N

- Notices, 13

O

- ooRexx License, 15
- OPEN method
 - scvStream, 4
- Open Object Rexx License, 15

Q

- QUALIFIER attribute
 - scvStream, 6

S

- SETHEADERS method
 - scvStream, 5
- SKIPHEADERS attribute
 - scvStream, 6

T

- TE subcommand
 - hostemu, 11
- TS subcommand
 - hostemu, 11

