

ooRexx

Documentation 5.2.0

Open Object Rexx

ooRexx Build Machine



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Preface

This book describes the Open Object Rexx release build machine environment.

This book is intended to document the release and build environment for ooRexx. It is a description of the build machine environment as well as a user guide to building ooRexx releases using the build machine.

1. Document Conventions

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

1.1. Typographic Conventions

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 is used to highlight literal strings, class names, or inline code examples. For example:

The **Class** class comparison methods return **.true** or **.false**, the result of performing the comparison operation.

This method is exactly equivalent to **subword(*n*, 1)**.

Mono-spaced Normal denotes method names or source code in program listings set off as separate examples.

This method has no effect on the action of any `hasEntry`, `hasIndex`, `items`, `remove`, or `supplier` message sent to the collection.

```
-- reverse an array
a = .Array-of("one", "two", "three", "four", "five")

-- five, four, three, two, one
aReverse = .CircularQueue~new(a~size)~appendAll(a)~makeArray("lifo")
```

Proportional Italic is used for method and function variables and arguments.

A supplier loop specifies one or two control variables, *index*, and *item*, which receive a different value on each repetition of the loop.

Returns a string of length *length* with *string* centered in it and with *pad* characters added as necessary to make up length.

1.2. 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, like mandatory initialization. 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. 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.

2.1. The Open Object Rexx SourceForge Site

The *Open Object Rexx Project*¹ utilizes *SourceForge*² to house the *ooRexx Project*³ 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](#)⁴ 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](#)⁵ page. This list is for discussing using ooRexx. It also supports a historical archive of past messages.

¹ <http://www.oorexx.org/>

² <http://sourceforge.net/>

³ <http://sourceforge.net/projects/oorexx>

⁴ http://sourceforge.net/mail/?group_id=119701

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

The Announcements Mailing List

You can subscribe to the oorexx-announce mailing list at [ooRexx Mailing List Subscriptions](#)⁶ 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](#)⁷ 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](#)⁸ 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](#)⁹ 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](#)¹⁰ page.

Patch Reports

If you create an enhancement patch for ooRexx please post the patch using the [ooRexx Patch Report](#)¹¹ 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](#)¹² page. There are currently three forums available: Help, Developers and Open Discussion. In addition, you can monitor the forums via email.

2.2. The Rexx Language Association Mailing List

The [Rexx Language Association](#)¹³ 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](#)¹⁴ or the [RexxLA Membership Application](#)¹⁵ page.

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

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

⁸ http://sourceforge.net/tracker/?group_id=119701&atid=684730

⁹ http://sourceforge.net/tracker/?group_id=119701&atid=1001880

¹⁰ http://sourceforge.net/tracker/?group_id=119701&atid=684733

¹¹ http://sourceforge.net/tracker/?group_id=119701&atid=684732

¹² http://sourceforge.net/forum/?group_id=119701

¹³ <http://www.rexxla.org/>

¹⁴ <http://rexxla.org/>

¹⁵ <http://www.rexxla.org/rexxla/join.html>

2.3. comp.lang.rexx Newsgroup

The [comp.lang.rexx](http://groups.google.com/group/comp.lang.rexx/topics?hl=en)¹⁶ 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.

3. Related Information

See also: *Open Object Rexx: Reference*

¹⁶ <http://groups.google.com/group/comp.lang.rexx/topics?hl=en>

Release Build Environment Description

1.1. Requirements

In early 2007 the Rexx Language Association and the Open Object Rexx Development Team determined that it was time to provide a build environment for the Open Object Rexx (ooRexx) application. An environment was needed that met the following requirements:

- Provide Internet access so that anyone could obtain an up-to-date build release of ooRexx.
- Provide a variety of software build environments for multiple operating systems.
- Provide an automated solution for each supported build environment so that a minimum of human interaction is needed to perform a build of ooRexx.
- Make all builds available to the Internet. Only keep 30 days of builds available.
- Support the Subversion (SVN) source repositories.

1.2. Solution

From these requirements a plan was established to implement them. Several decisions were made early on that influenced the final design.

- Rather than purchasing individual servers for each operating system to be supported it was determined that a better solution would be to purchase one large server and use the Linux kernel Virtual Machine (KVM) environment to provide support for multiple operating systems.
- Since the ooRexx Project is an open source project it was determined anyone should be able to get access to a build.
- It was determined that we should use Fedora Linux to host the KVM environment. This would ease security concerns and provide the easiest setup.

1.3. Update 2018-2023

After having been hosted in a cloud solution for some time, with some performance problems, it was decided to try to migrate the build system to an environment more in line with the solution initially drawn up. It was agreed that the requirements were essentially the same as before. Rather than using a Linux kernel Virtual Machine (KVM) environment, Virtualbox from Oracle was chosen. VirtualBox is one of the world's most popular open source, cross-platform, virtualization platforms and seemed a good choice, in particular since there was limited knowledge of the Linux kernel Virtual Machine in the team.

1.4. New Solution

- The current solution implements a Jenkins open source automation client/server solution. It was determined that rather than running all the software on one single powerful (and expensive) server, a better solution would be to use one server as a controller, running the Jenkins webserver, and to connect to distributed agents provided by volunteers. This is also the recommended setup for Jenkins, since running agent tasks on the controller is deprecated for safety reasons. This also requires only a moderately powerful server and the build system is easily scalable. Initially one server and three agents were donated to the project (Windows, macOS and Raspberry PI Linux agents) and further remote agents were contributed later.

- During 2021 and 2022 it was once again experimented with virtualisation, this time using Virtualbox running on a machine separated from the Jenkins controller.
- The server used as Controller was set up using Ubuntu, whereas the machine hosting Virtualbox was a macOS machine. Since macOS can only be installed in a VM running on true Apple hardware, this provided the additional advantage that all kinds of platforms could be set up in virtual machines (Windows, macOS, Linux, Unix). Since then we have access to 3 physical machines running macOS (High Sierra, Sequoia and Tahoe) and no longer need to run macOS in virtual machines.
- During 2023 all the Windows VMs (Windows 7, 8.1 10 and 11) were moved to a separate machine running Virtualbox under Windows 10 to see if this would alleviate some problems experienced with the testing frameworks sometimes hanging upon completion. Unfortunately this did not improve the situation but since new licenses were required for every installation it was decided to keep the Windows VMs on a machine running Windows. During 2025 the Windows machine was upgraded to Windows 11 and the official ooRexx installer for Windows is now built on Windows 11 natively. Building natively does not show the problem with hangs seen in VMs.

Build Machine (Controller) Functional Description

The following is the server hardware configuration to support the ooRexx build environment:

Dell T20 server
Quad Core Intel® Xeon® 3.2 GHz CPU
12GiB DDR3
System disk: Crucial BX500 240 GB 3D NAND SATA 2,5-Zoll SSD
Data disk: 1 TB TOSHIBA DT01ACA100 (MS20A7S0)
Backup disk: WDC Western Digital WD5000AAVS-00ZTB0 (01.01B01)
CDROM/DVD R/W

The following operating system and ooRexx is currently installed on the Controller (2026-03-12):

- Ubuntu 24.04 LTS
- ooRexx version 5.2.0beta (current beta is built for Ubuntu 24.04)

2.1. Build Host User Accounts

After Ubuntu was installed on the Controller one user account was established to own everything concerning the build process and administration of the server. The account name was *jenkins*. This account is very important because it will own the shared files for the guest operating systems.

A *jenkins* account is used on all physical machines, whereas a *osboxes* account is used on all virtual machines. More about this later.

2.2. Disk Layout

The Jenkins server is using a 240 GB SSD as a system disk and a 1 TB HDD for Data. The system disk is using the standard partitioning for Ubuntu.

2.3. Operating System Installation

Ubuntu was downloaded from <https://ubuntu.com>. The LTS version of Ubuntu was chosen to keep maintenance low. A download was chosen that can be used from a USB memory stick and all the installation process was run through with most if not all option set to default. The instructions on setting up guest operating systems are described in the sections describing each individual guest OS.

Virtual Machine Setup Guide

3.1. Virtualbox Installation

Virtualbox is installed on a machine running macOS as well as on a machine running Windows 11. Virtualbox is freely available from Oracle as Open Source Software under the terms of the GNU General Public License (GPL) version 3. See also <https://www.virtualbox.org/> It is advisable to install the latest version of Virtualbox. We are currently running version 7.2.2 on macOS and 7.2.6 on Windows. The version upgrades are performed sparingly since the upgrades have a risk of making older VMs stop working, and for windows, to require new licenses.

3.2. Virtualbox Setup

There are only a few options to be concerned about in this area. For many of the platforms there are ready-made images that work out-of-the-box having what should be a normal setup for a normal user. For some platforms it was necessary to build everything from scratch using an ISO image that could be loaded at boot-time.

Once installed the virtual disks are moved to a separate 2TB physical SSD disk, thereby reducing the load on the systems disk.

3.3. TCP/IP Setup for Virtual Machines

For easier maintenance the Virtual Machines were set up to use a fixed IP range, controlled by the router. Non-standard ports were then allocated to the VMs so that they can be reached both by the Jenkins Controller and by using ssh from remote. In this manner it is possible for developers to use the various platforms for testing purposes.

Guest Operating Systems

4.1. Overview of platforms and operating systems

ooRexx is built on both native platforms and in virtual machines. This is a listing of all the platforms 2026-03-12 in the order of appearance:

4.2. Overview of Physical Machines

ooRexx is built on these platforms

- Marks-M4-Mac Mark Hesslings M4 Mac on ARM64 hardware, running macOS 26 (Tahoe);
- ams-02 René's Raspberry Pi 4 Model B (aarch64) running Ubuntu 22.04.5 LTS;
- pos-MacPro-12Core: Mac Pro 5,1 (2010), Dual Processor 6-Core Intel Xeon @ 2,93 GHz, Memory: 96 GB. running macOS 10.13.6 (High Sierra);
- pos-MacPro-16Core: Mac Pro 7,1 (2019), Processor 16-Core Intel Xeon W @ 3,2 GHz, Memory: 96 GB. Hosting Virtualbox for all Linux, Unix and further platforms, running macOS 15.3 Sequoia;
- pos-Pi-2B Raspberry PI 2B, Broadcom BCM2837 armv7l Quad Core Processor, ARM 32 bit Running Raspbian GNU/Linux 11 (bullseye);
- pos-Pi-3BPlus Raspberry PI 3B+, SoC: Broadcom BCM2837B0 Quad-Core A53 (ARMv8+) 64-bit aarch64 Running Debian GNU/Linux 11 (bullseye);
- pos-Windows XPC-FH97 with Processor Intel(R) Core(TM) x64-based i7-4770T CPU @ 2.50GHz, 16,0 GB RAM, Hosting all Windows VMs running 64-bit Windows 11;
- ubuntu16 Erich's Ubuntu 16.04 agent;

4.3. Overview of Windows VMs

ooRexx is built and tested on these platforms in 32 and 64 bit versions, No installers for these platforms are uploaded, rather the installers built for Windows 11 on pos-Windows are used for all supported versions of Windows (see below):

- pos-vbox-Windows7 VM with 1CPU, 2GB memory, 500GB SSD, build and test 32 and 64-bit ooRexx
- pos-vbox-Windows8 VM with 1CPU, 2GB memory, 500GB SSD, build and test 32 and 64-bit ooRexx
- pos-vbox-Windows10 VM with 1CPU, 2GB memory, 500GB SSD, build and test 32 and 64-bit ooRexx
- pos-vbox-Windows11 VM with 1CPU, 2GB memory, 100GB SSD, build and test 32 and 64-bit ooRexx

4.4. Overview of macOS VMs

There are currently no macOS VMs for building ooRexx. Builds and tests are made for High Sierra and Sequoia on Intel hardware and for Tahoe on ARM64 hardware (M or Apple Silicon hardware). There

is a "Fat" binary uploaded that can be used on both platforms for all supported OS versions from High Sierra and forward.

4.5. Overview of Debian descendant VMs

ooRexx is built on these platforms in 64 bit version and installers prepared

- pos-vbox-Debian12 VM with 1CPU, 2GB memory, 500GB SSD, build and test 64-bit ooRexx on Debian 12, build .deb package
- pos-vbox-Ubuntu24 VM with 1CPU, 2GB memory, 500GB SSD, build and test 64-bit ooRexx on Ubuntu 24.04 LTS build .deb package
- pos-vbox-Ubuntu22 VM with 1CPU, 2GB memory, 500GB SSD, build and test 64-bit ooRexx on Ubuntu 22.04 LTS build .deb package
- pos-vbox-LinuxMint22 VM with 1CPU, 2GB memory, 500GB SSD, build and test 64-bit ooRexx on Linux Mint 22, build .deb package

4.6. Overview of RPM descendant VMs

ooRexx is built on these platforms in 64 bit version and installers prepared

- pos-vbox-CentOS10 VM with 1CPU, 2GB memory, 500GB SSD, build and test 64-bit ooRexx on CentOS 10, build .rpm package
- pos-vbox-Fedora43 VM with 1CPU, 2GB memory, 500GB SSD, build and test 64-bit ooRexx on Fedora 43, build .rpm package
- pos-vbox-OpenSuse15 VM with 1CPU, 2GB memory, 500GB SSD, build and test 64-bit ooRexx on OpenSuse 15.6 (Leap), build .rpm package

4.7. Overview of BSD descendant VMs

ooRexx is built on these platforms in 64 bit version

- pos-vbox-FreeBSD14 VM with 1CPU, 2GB memory, 500GB SSD, build and test 64-bit ooRexx on FreeBSD 14.3, build .pkg package
- pos-vbox-OpenBSD7 VM with 1CPU, 2GB memory, 16GB SSD, build and test 64-bit ooRexx on OpenBSD 7.8, no package is built currently
- pos-vbox-NetBSD10 VM with 1CPU, 2GB memory, 100GB SSD, build and test 64-bit ooRexx on NetBSD 10.1, only Portable package is built currently

4.8. >Overview of Arch Linux VMs

ooRexx is built on these platforms in 64 bit version

- pos-vbox-Manjaro VM with 1CPU, 2GB memory, 500GB SSD, build and test 64-bit ooRexx on Manjaro, only Portable package is built currently
- pos-vbox-ArchLinux VM with 1CPU, 2GB memory, 500GB SSD, build and test 64-bit ooRexx on ArchLinux, only Portable package is built currently

4.9. >Overview of other UNIX VMs

ooRexx is built on these platforms in 64 bit version

- pos-vbox-OpenIndiana VM with 1CPU, 2GB memory, 500GB SSD, build and test 64-bit ooRexx on OpenIndiana Hipster 2025.10 (powered by illumos), only Portable package is built currently
- pos-vbox-Solaris11 VM with 1CPU, 4GB memory, 32GB SSD, build and test 64-bit ooRexx on Solaris 11.4, only Portable package is built currently

4.10. >Overview of experimental VMs

ooRexx is NOT built on these platforms, used for experiments only

- Minix 3.4 VM with 1CPU, 1GB memory, 500GB SSD
- OS/2 or ArcaOS with 1CPU, 1GB memory, 500GB SSD
- Windows XP with 1CPU, 1GB memory, 500GB SSD

Build Machine Administration

No content yet.

Building ooRexx Releases Using Jenkins

All the information necessary for building a release can be found in the document `release-steps.md` that can be found in the SVN tree under `ooRexxSVN-Code-0/main/trunk/`. For all the work that needs to be done to the automated build of all platforms there is one script `Modifybuildjobs.rex` that needs to be updated and run during the creation of a release candidate. It is placed in `ooRexxSVN-Code-0/build-utilities/trunk/common/release/` together with a file `"Necessary steps to perform when making a new release for ooRexx.txt"` that set out step-by-step how to make a releasebuild using the Jenkins build machine.

Appendix A. Notices

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



The railroad diagrams were generated with the help of "Railroad Diagram Generator" located at <https://github.com/GuntherRademacher/rr>. Special thanks to Gunther Rademacher for creating and maintaining this tool.



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Version 1.0

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 - b. additions to the Program;

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Appendix C. Revision History

Revision 0-0 Tue Aug 7 2012

David Ashley

Initial creation of book by publican

Revision 1-0 Wed OCT 18 2023

Per Olov Jonsson

Initial creation of book by publican

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