

Hacks, Tips & Tricks to Install NetRexx 4 & BSF4ooRexx on the RPi 4 Using Oracle Linux 8

Rexx Language Association 2022 Symposium

A Presentation of Installation, Setup and Configuration How Tos for NetRexx v4.03 Beta, ooRexx 5.0 Beta and BSF4ooRexx v641 GA on an Oracle Linux v8.6 GNOME Desktop Platform for the Raspberry Pi 4

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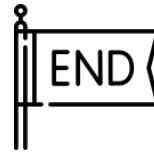
Death of the Stable CentOS Linux Project

Decision by Red Hat to End Support for the Legacy CentOS Projects

End of Life Dates:

CentOS 7: June 30, 2024 (Matches RHEL 7 EOL)

CentOS 8: ~~December 31, 2021~~



Successors for CentOS 8 Linux (x64 and aarch64 Architectures):

Alma Linux 8 and 9

Rocky Linux 8 and 9

OpenSUSE Leap 15.3 (Near EOL) 15.4 Leap and Tumbleweed (Rolling)

Oracle Linux 8 and 9 (Introduced June 2022)

CentOS 9 Stream (Rolling)

Fedora Linux

Pros & Cons of Alternative RPM Based Linux Distros

Alma Linux:

Long Life Cycle; Follows RHEL Code Base Closely; Lacks Libre Office Suite RPM Meta-package

Rocky Linux:

Long Life Cycle; Follows RHEL Code Base Closely; Lacks Libre Office Suite RPM Meta-package

OpenSUSE Leap 15.3:

Has LibreOffice Suite; Deviates from RHEL8 Code Base; Unable to Install RPi Userland Utilities

Oracle Linux 8:

Longest Life Cycle; Deviates from RHEL8 Code Base; Lacks Libre Office RPM Meta-package Suite; GNOME Desktop Buggy prior to Release 8.6

Fedora Linux :

Has LibreOffice Suite; Very Short Life Cycle of One Year; “Bleeding Edge” Packages

Challenges with Installing Oracle Linux 8 on RPi4

Only Server Image Exists for Imaging on micro SDHC Card

Same Issue for AlmaLinux 8 and Rocky Linux 8

Burning the Server Image to a micro SDHC Card is Easy

The Following Tools Work:

Raspberry Pi Imager for Windows (64 Bit Only), Linux (64 Bit), the RPi4 (Both 32 and 64 Bit) or Mac OS

Balena Etcher for Intel Based Linux (Both 32 and 64 Bit), Windows (32 and 64 Bit) and Mac OS (x64)

Win32 Disk Imager for Windows (32 Bit; Can Be Used on 64 Bit)

Linux “dd” Utility

Recommend the Raspberry Pi Imager or Balena Etcher for the Easy to Use GUI

Open SUSE Leap 15.* Images Include GUI Desktop Images

Partitioning Configuration Required to Expand Boot Partition for Oracle Linux Server

Not really a difficult thing to do if the right utilities are installed (e.g. – `btrfs-progs` RPM Package)

How To Create a Initial Oracle Linux 8 Server - I

Oracle Link for Oracle Linux Arm Downloads:

<https://www.oracle.com/linux/downloads/linux-arm-downloads.html>

V8.5,V8.6 and V9.0 Image Files:

rpi-ol8-image-20211116.img.xz (Used For Presentation Install v8.5)

rpi-ol8.6-image-20220517.img.xz (Latest v8.6)

rpi-ol9.0-image-20220628.img.xz (Initial v9.0)

Flash image to a Micro SDHC Card:

32 GB Minimum for GUI Desktop

64 GB Recommended for Added Rexx and Java Development Work

Good Brands of Micro SDHC Cards:

Source: <https://www.techradar.com/news/bet-sd-and-microsd-memory-cards>

San Disk

Samsung

Lexar

Once Image is Burned:

The micro SD Card can be transferred to the Raspberry Pi4 for the Initial Startup and Setup of the Server

How To Create a Initial Oracle Linux 8 Server - II

Oracle Linux root Account Credentials:

Id: root Password: oracle

You will be Prompted to Change The Root Password

Sample Login Screen:

```
Oracle Linux Server 8.2
Kernel 5.4.17-2011.7.4.el8uek.aarch64 on an aarch64

rpi login: root
Password:
You are required to change your password immediately (administrator enforced)
Current password:
New password:
Retype new password:
[root@rpi ~]# _
```

How To Create a Initial Oracle Linux 8 Server - III

Expand The Size of The Root Partition to Utilize Full Capacity of Micro SDHC Card:

lsblk (Check output for `/dev/mmcblk#` where # is the Device number to note)

growpart `/dev/mmcblk#?` (Where ? Is the Partition number of the root partition to note)

==> Device Number is usually 0 or 1 and Root partition is usually 3

yum install btrfs-progs (Install the programs to manage and resize btrfs Linux File Systems)

btrfs filesystem resize max / (Resize the root partition)

Reference URL: <https://docs.oracle.com/en/operating-systems/oracle-linux/8/relnotes8.3/ol8-arm-only.html#ol8-arm-raspberry>

Add a New User with Default Group and \$HOME Directory:

useradd -m <username>

Set The Password for the Newly Added User:

passwd <username>

Add The New User to the Group “wheel”:

usermod -a -G wheel <username>

Recommendation: At this Point Run a System Update to Update All Base Image Packages:

yum update -y

How To Create a GUI Version of Oracle Linux 8 Server - I

Server GUI Installation Can Be Tricky

Recommendation: Backup the Installation Work



Shutdown the Server with Current Work Performed

Remove the SDHC Card from the Raspberry Pi 4

Transfer the SDHC Card to another Linux System

Identify and Note the Micro SDHC Device Volume and its Size:

```
$ lsblk
```

The Micro SDHC is usually something like: “/dev/sd?” (where ? Is a lowercase letter from **a** to **z**)

Use the Linux **dd** Utility to Backup the Micro SDHC Card

```
$ sudo dd if=/dev/sd? of=/path/to/backup-media/ol85image.img bs=1M status=progress
```

How To Create a GUI Version of Oracle Linux 8 Server - II

Once Backup is Complete, unmount or eject the Micro SDHC Card

Transfer the Card Back to the Raspberry Pi 4 & Startup the RPi4

Login Using the “root” Account and Password

Verify the Base RPM Package Repositories Currently Installed:

```
# yum repolist
```

Note The Base Repositories

You will need to Add YUM Repositories to Get a Working Updated GNOME Desktop GUI ...

How To Create a GUI Version of Oracle Linux 8 Server - III

Verify/Add The Following Oracle, EPEL & Fedora Repositories to Your System:

<u>Repository ID</u>	<u>Repository Name</u>
epel	Extra Packages for Enterprise Linux 8 – aarch64 (add)
epel-modular	Extra Packages for Enterprise Linux Modular 8 – aarch64 (add)
ol8_appstream	Oracle Linux 8 Application Stream (aarch64 – verify)
ol8_baseos_latest	Oracle Linux 8 BaseOS Latest (aarch64 – verify)
ol8_codeready_builder	Oracle Linux 8 CodeReady Builder (aarch64) – Unsupported (enable)
rpmfusion-free-updates	RPM Fusion for EL 8 - Free – Updates (add optional)
rpmfusion-nonfree-updates	RPM Fusion for EL 8 - Nonfree – Updates (add optional)

How To Create a GUI Version of Oracle Linux 8 Server - IV

Add Yum Utilities Package with Dependencies

```
# yum install yum-utils -y
```

Search Repolist of All Available Repositories

```
# yum repolist all
```

Enable The Oracle 8 Code Ready Builder Repository

```
# yum-config-manager --set-enable "ol8_codeready_builder"
```

The Oracle EPEL Repositories are Flawed; Best to Use The Fedora Repository

```
# yum install --nogpgcheck https://dl.fedoraproject.org/pub/epel/epel-release-latest-8.noarch.rpm
```

Adds the Following EPEL Repositories:

```
epel
```

```
epel_modular
```

How To Create a GUI Version of Oracle Linux 8 Server - V

Install The RPMFusion Repository (for Optional Packages):

```
# yum install https://mirrors.rpmfusion.org/free/el/rpmfusion-free-release-8.noarch.rpm -y
```

Install The RPMFusion Repository (for Optional Non-Free Packages):

```
# yum install https://mirrors.rpmfusion.org/nonfree/el/rpmfusion-nonfree-release-8.noarch.rpm -y
```



Availability of the RPMFusion Packages Above Can Be Variable

404 For Hosts Frequently; Too Many Repos Can Cause System Update Issues

Check to Verify The Installation of The Repositories

```
# yum repolist
```

Results Should Be Similar to Slide 11 For Installed Repositories

How To Create a GUI Version of Oracle Linux 8 Server - VI

As root User Perform a System Update:

```
# yum update -y
```

Install the Server with GUI Group of RPM Packages:

```
# yum groupinstall "Server with GUI"
```

Set Graphical Default Start Up Mode:

```
# systemctl set-default graphical
```

Reboot The System

Verify the Ability to Login to User Account Via GNOME Panel

- If GUI does not launch, sign in with your newly created account credentials
- Then type the following command to start the X11 GUI Desktop

```
$ startx
```

Activate the Wired Connection and Update The Settings >>Date & Time From The Top Right Corner System Icon

If Successful the Date in the Middle Top Bar Should Be Updated to the Current Date and Time

Installing The Open JDK 1.8 Development Env

The Java OpenJDK 1.8 JRE is already installed

That's All You Really Need if Your Plans Are To Only Write NetRexx Code

If Your Plans Include OpenJDK Java Development Install The Following RPM Package with Dependencies:

```
$ sudo yum install java-1.8.0-openjdk-devel
```

Verify the Version of the Java Runtime and the Java Compiler:

```
$ java -version
```

```
$ javac -version
```

Returns javac 1.8.0_322 (latest version as of April 20, 2022)

Optionally You Can Set The \$JAVA_HOME Environment and Prepend That To Your System Path for BASH Shell for Your Login:

```
$ sudo yum install nano
```

```
$ cd $HOME
```

```
$ nano .bashrc
```

Add the following lines to the end of the file

```
export JAVA_HOME=/usr/lib/jvm/java-1.8.0-openjdk
```

```
export PATH=$JAVA_HOME/bin:$PATH
```

Ctrl-O Saves The Changes

Ctrl-X Exits nano

Installing NetRexx Version 4 - I

Download The Version of Net Rexx that You Desire

For This Experimental Install I Downloaded the NetRexx 4.03 Beta

URL: <http://www.netrexx.org/files/NetRexx-4.03-BETA.zip>

I Installed NetRexx in the /opt Directory:

```
$ cd /opt
```

```
$ mkdir netrexx
```

```
$ cd netrexx
```

```
$ sudo cp $HOME/Downloads/NetRexx-4.03-BETA.zip .
```

```
$ sudo unzip NetRexx-4.03BETA.zip
```


Installing NetRexx Version 4 - II

Setup and Verifying The Net Rexx Installation

Add The Following Lines to Your `$HOME/.bashrc` File:

```
export NETREXX_HOME=/opt/netrexx
export PATH=$PATH:$NETREXX_HOME/bin
```

Copy The NetRexx Library Jar Files to the JRE Library Extensions Directory of the JDK Install:

```
$ sudo cp /opt/netrexx/lib/*.jar $JAVA_HOME/jre/lib/ext
$ sudo cp /opt/netrexx/runlib/*.jar $JAVA_HOME/jre/lib/ext
```

Startup a New BASH Shell and Try To Compile A NetRexx Program:

```
$ sh NetRexxC.sh /path/to/myprogram.nrx
```

Verify the Creation and Execution of The `.class` File

```
$ java /path/to/myprogram
```

Refer to the `read.me.first` file for tips on compiling & running NetRexx programs

The NetRexx Quick Start Guide PDF is also very useful

Building The ooRexx v5.0 Beta - I

If You Are Serious About Building Any Linux Packages from Source Tar Balls ... Install the Following Group of Packages:

```
$sudo yum groupinstall "Development Tools"
```

Additionally for Checking Out & Building the Latest ooRexx Source:

```
$ sudo yum install cmake ncurses-devel subversion
```

Create a \$HOME Based ooRexx Development Directory:

```
$ cd $HOME
```

```
$ mkdir objrexx/build
```

```
$ cd objrexx/build
```

Building The ooRexx v5.0 Beta - II

Checkout the Source Forge ooRexx Source Code:

```
$ cd $HOME/objrex/obj
```

```
$ svn checkout svn://svn.code.sf.net/p/ooRexx/code-0/main/trunk ooRexx-code-0
```

Source Forge ooRexx Web URL:

<https://sourceforge.net/p/ooRexx/code-0/HEAD/tree/>

As of April 2022 There Are No aarch64 .RPM Files for ooRexx v5.0

Checkout, Build The ooRexx Source and Install The ooRexx Binary:

```
$ cd ooRexx-code-0
```

```
$ cmake .
```

```
$ sudo make install
```

Verify the ooRexx Version:

```
$ rexx -V <== Note: If run as sudo, it does not find the rexx binary if in /usr/local/bin
```

Building The ooRexx v5.0 Beta - III

Issue With ooRexx Available for sudo Execution:

```
$ sudo rexx -v
```

Results In:

```
sudo: rexx: command not found
```

Also the Oracle Linux 8 and 9 Installations Do Not Have a \$LD_LIBRARY_PATH Environment Variable Setting that can be ECHO'd from a BASH Shell

This Causes Issues with Running a BSF4ooRexx Source Programs from the Shell

To Workaround ... Add the Following to .bashrc for the non-root user:

```
export LD_LIBRARY_PATH=/usr/local/lib:/usr/local/lib64:/usr/lib:/usr/lib64
```

Installing and Configuring BSF4ooRexx on Oracle Linux 8 - I

Download the Latest v641 GA Release From The Source Forge Site
URL:

<https://sourceforge.net/projects/bsf4oorexx/files/latest/download>

Extract the Zip Archive to a \$HOME Directory of Your Choosing

Modify the install.sh file to Remove sudo:

```
sudo rexx setupAllAndRun.rex install
```

Login as root User Before Executing the Command:

```
# sh ./install.sh
```

This Should Allow the BSF4ooRexx Install Program to Run
Successfully

Installing and Configuring BSF4ooRexx on Oracle Linux 8 - II

BSF4ooRexx Files Installation Root Directory:

```
/opt/BSF4ooRexx
```

Copy The bsf*.jar File to:

```
$JAVA_HOME/jre/lib/ext
```

Copy The libBSF4ooRexx.so File to:

```
/usr/local/lib
```

Make Sure the \$LD_LIBRARY_PATH Mods are applied to .bashrc

Verify Your \$JAVA_HOME, \$LD_LIBRARY_PATH and \$PATH Directories:

```
$ echo $JAVA_HOME
```

```
$ echo $LD_LIBRARY_PATH
```

```
$ echo $PATH
```

Installing and Configuring BSF4ooRexx on Oracle Linux 8 - III

Test Out A BSF4ooRexx Code Sample using Linux rexxj2.sh ...

```
$ cd /opt/BSF4ooRexx
```

```
$ sh ./rexxj2.sh /path/to/my/bsf4oorexxpgm.rex
```

Example

```
$ sh ./rexxj2.sh $HOME/bsf4oorexx/source/JavaVersion.rex
```

BSF4ooRexx Source Code (Pretty Much a One Liner)

```
- call bsf.cls
```

```
- say "java.version:" .java.lang.System~getProperty("java.version")
```

Java Version Output

```
java version: 1.8.0_322
```

Findings ...

Findings with Oracle Linux 8.5 (aarch64):

Better Stability than Oracle Linux 7.9

GNOME GUI Did Work in OL 8.5 and later; Failed to Work in OL 7.9

LibreOffice Package Not Available for Installation

Files (Nautilus) File Manager

Crashes with a Core Segmentation Fault in Initial 8.5 Image

System Update Eventually Fixed The Issue

Workaround: Install Alternative File Manager

```
$ sudo yum install mc <== Midnight Commander (Curses Based)
```

```
$ sudo yum install spacefm <== Space FM File Manager (GUI)
```

`$LD_LIBRARY_PATH` Environment

Environment Variable Not Generated on Startup

Workaround: Added to `.bashrc` for Local User Availability

Resolves Rexx so.4 Library Not Found Errors for BSF4ooRexx GA v641

Java 1.8 Implementation Does Include the Sun HttpServer Package

and More Findings ...

More Findings:

LibreOffice is an available RPM Meta Package for Open SUSE Leap 15.3+ and Fedora 35+

Open SUSE Does Not Require Additional Configuration for a Desktop Environment

Open SUSE Offers The Largest Number of Installation Packages

Alma Linux & Rocky Linux Have More Standard Library Environments than Oracle Linux

As a Result ... Less Configuration Effort to Build Alma Linux and Rocky Linux Rpi Images

Alma Linux & Rocky Linux Have Swap Space Utilization Issues on Kernel Updates;
Oracle Linux Does Not Have This Issue

Oracle Linux and Open SUSE Offer Extensive Documentation for Installing The Distros
on the Raspberry Pi 4

Recommendations

Easiest To Install Rankings ...

1. Open SUSE Leap
2. Fedora (RPM Fusion Image)
3. Alma Linux (Git Hub Image)
4. Rocky Linux
5. Oracle Linux

Easiest to Maintain Rankings ...

1. Open SUSE Leap 15.3+
2. Fedora 35+
3. Oracle Linux (8.6 Easier Than 9 Currently)
4. Alma Linux (Issues with Swap File Space on Kernel Upgrades)
5. Rocky Linux (Issues with Swap File Space on Kernel Upgrades)

More Recommendations

Longest Life Cycle Rankings with End of Support Life Dates ...

1. Oracle Linux 8 (July 1, 2029)
2. Rocky Linux 8 (May 31, 2029)
3. Alma Linux 8 (January 1, 2029)
4. Open SUSE (November 30, 2022)
5. Fedora 35 (November 16, 2022)

If LibreOffice Is A Must ...

Use Fedora 35+ or Open SUSE Leap 15.3+ or Install The Flatpak Package of LibreOffice on Oracle, Rocky or Alma Linux GNOME Desktop RPi Distros

Installing LibreOffice with Flatpak

Oracle Linux 8 & 9 Already Have Flatpak Installed as Part of GNOME Desktop “Server with GUI” Group Install

The Following Flatpak Commands Will Install The LibreOffice Flatpak Package with Dependencies:

```
$ sudo flatpak remote-add --if-not-exists flathub https://dl.flathub.org/repo/flathub.flatpakrepo
```

```
$ flatpak install --from https://flathub.org/repo/appstream/org.libreoffice.LibreOffice.flatpakref
```

Source: Addictive Tips – How To Install LibreOffice On Linux

URL: <https://www.addictivetips.com/ubuntu-linux-tips/install-libre-office-on-linux/>

List of Key Web References - I

Reference	URL
Oracle Linux for Arm Downloads	https://www.oracle.com/linux/downloads/linux-arm-downloads.html
Oracle Linux 8 Release Notes for Oracle Linux 8.3 – 6.7 Installing the Raspberry Pi™ Image (aarch64)	https://docs.oracle.com/en/operating-systems/oracle-linux/8/relnotes8.3/ol8-arm-only.html
Help Center – Oracle Linux 8 – All Documentation	https://docs.oracle.com/en/operating-systems/oracle-linux/8/
Managing Software in Oracle Linux 8	https://docs.oracle.com/en/operating-systems/oracle-linux/software-management/
Browse Oracle Linux 8 Package Repositories	https://yum.oracle.com/oracle-linux-8.html

List of Key Web References - II

Reference	URL
Install Oracle Linux on a Raspberry Pi using Balena Etcher	https://talesfromthedatacenter.com/2020/11/install-oracle-linux-8-on-a-raspberry-pi/
You Tube – Installing the EPEL Repository on Oracle Linux 8	https://www.youtube.com/watch?v=R-hAYGEYWQ0
RedHat Customer Portal -- 8.4.5. Adding, Enabling, and Disabling a Yum Repository	https://access.redhat.com/documentation/en-us/red_hat_enterprise_linux/6/html/deployment_guide/sec-managing_yum_repositories
How to Install / Enable RPM Fusion On CentOS 8 Stream	https://www.linuxcapable.com/how-to-install-enable-rpm-fusion-on-centos-8-stream/
Rexx LA 2020 Symposium – Building ooRexx v5 Beta for the RPi4 (Slide 35)	https://www.rexxla.org/presentations/2020/RexxLA2020-RPi4LinuxDesktopEnvs4Rexx-TDycks.pdf

End of Presentation

Special Thanks and Acknowledgements to ...



Rene` Jansen for the How To of Building the ooRexx 5 Beta

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Questions?

Comments?