Implementing Rexx on the Libre Computer 'Le Potato' SBC

Libre Computer

2023 Rexx Language Association Symposium
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Last Revised: May 15, 2023

THE **Rexx** LANGUAGE ASSOCIATION

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Overview

Libre Computer

- History & Goal of the Libre Computer Project
- Libre Computer Project SBC Models
- Technical Specifics of the 'Le Potato' SBC
- 'Le Potato' vs. Raspberry Pi 3B
- Available Linux Distros for 'Le Potato'
- Installing Armbian Linux
- Installing OpenJDK 8
- Installing NetRexx 4.04
- Installing ooRexx 5.0
- Installing BSF4ooRexx
- Findings and Recommendations
- List of Web References

History & Goal of the Libre Computer Project

- Project by **Shenzhen Libre Technology Co., Ltd.**

- Shenzhen, Guangdong Province, China

- **Goal**: Produce standards-compliant single-board computers (SBC) and upstream software stack to power them

- **Crowd-funding** on Indiegogo and **Kickstarter** to market their **SBC designs**

- **Open Source** Projects

- **Technical Support** Lacking when Compared to the Raspberry Pi Products; Better than Average Compared to most SBCs

Libre Computer SBC Models

Libre Computer

- 3 SBC Models
  - ROC-RK3328-CC (Renegade)
  - **AML-S905X-CC (Le Potato)**
  - ALL-H3-CC (Tritium)
- All Models use **ARM Cortex CPUs**
- All Models use **Mali GPU Technology**
- **Cryptography Extensions** for the Renegade and Le Potato
- Le Potato Results from the Kickstarter Project
  - 658 Backers Pledged $43,560 to Fund Project as of 9/11/2022
  - Source:
    https://www.kickstarter.com/projects/librecomputer/libre-computer/libre-computer-board-next-gen-4k-sbc -dev=board-for/description

Tech Specs - Le Potato

Libre Computer

- Similar HW to Raspberry Pi 3 Model B
- **Amlogic S905X SoC** Board
- **ARM Cortex 64 Bit Quad Core** 1.512 GHz CPU
- Up to **2GB DDR3 SDRAM**
- **100 MB Fast Ethernet Port** for Internet Connectivity
- **No On Board WiFi Chip**; USB WiFi Adapter Required
- Spring Loaded **Micro SDXC Card Slot** for Basic Storage
- **Interface for eMMC 5.0 Storage** on Bottom of Board

Tech Specs - Le Potato ...

Libre Computer

- HDMI 2.0 Display Standard Size Port
- 4 USB Ports
- Audio Output Jack (Configured for HDMI Output)
- Can Run a Subset of Linux Server & Desktop Distros
  - Older Linux Kernel v4.19 (Debian)
  - Most Current/Used Linux Distro: **Armbian** (23.02 Current; 22.08 Used)
  - Older Versions: Debian (9 Stretch) and Ubuntu (16.04 LTS)

Tech Specs - Le Potato ...

- Additional Gaming & Home Theater PC OS Software
  - Retropie (Gaming)
  - Android (HTPC)
  - LibreELEC (HTPC)
  - Lakka (Gaming)
- Armbian v22.08 will be Selected for This Presentation
  - **Xfce** 4 Desktop
  - **Vast Repository** of Available Added Ubuntu .deb Packages

Le Potato vs. Raspberry Pi 3B

Libre Computer

- **Better Availability for Le Potato**
  - Less Supply Chain Issues
  - Available from Amazon or LoveRPi (reseller)
- **Hardware Outperforms RPi 3B** in Several Tests
- Le Potato **Uses Less Power** than the RPi 3B
- **iUniker RPi3B Case** Used with Modifications to Middle Part of Case to Fit Le Potato Board
- **Lower Price**
  - **Source**: Amazon – May 2023 (Compared to September 2022)
  - **Le Potato** – $35 USD (Price Drop from $45 in September 2022)
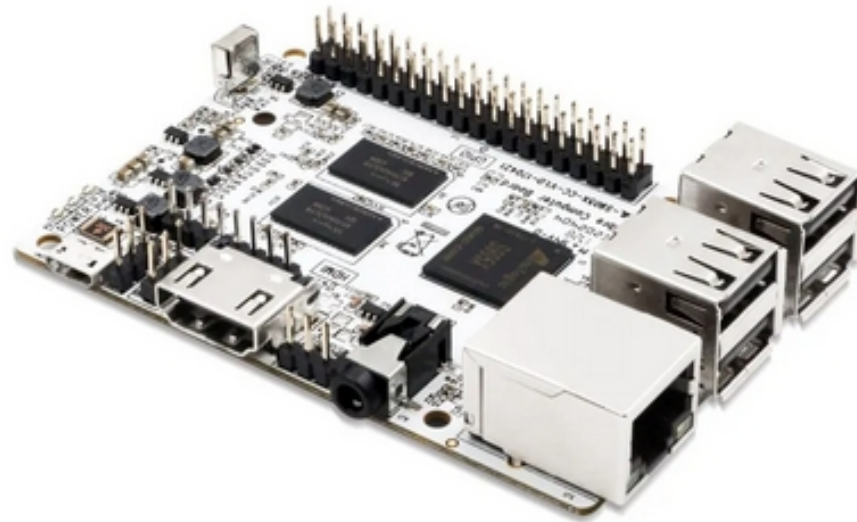 - **Raspberry Pi 3B+** Board – $100 USD (Price Drop from $139 USD in September 2022)

Le Potato vs. Raspberry Pi 3B

- Le Potato SBC Box and SBC Screenshot

Le Potato vs. Raspberry Pi 3B

- Le Potato SBC Screenshot

Le Potato vs. Raspberry Pi 3B

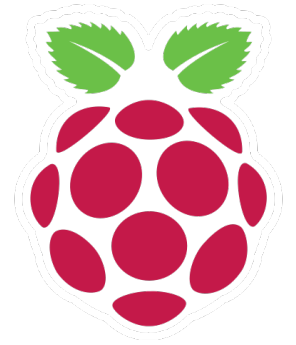- LoveRPi Raspberry Pi 3B Case for Le Potato Screenshot

Le Potato vs. Raspberry Pi 3B

- LoveRPi Heat-sink for Le Potato SBC Screenshot

Le Potato vs. Raspberry Pi 3B

- Raspberry Pi 3B SBC Screenshot

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Le Potato vs. Raspberry Pi 3B

- iUniker Raspberry Pi 3B Case Screenshot

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Installing Armbian Linux

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- Debian / **Ubuntu** Based Distro
- SBC Focus on Performance (Thrifty with RAM)
- Image Also Available for the Raspberry Pi 4B
- Le Potato Xfce Desktop Current Download URL:
- https://redirect.armbian.com/lepotato/Jammy_current_xfce
- Le Potato CLI Current Download URL:
- https://redirect.armbian.com/lepotato/Jammy_current

Installing Armbian Linux ...

- To Improve I/O **Select a High Quality Micro SDXC Card with UHS-I Capability**

- Good Brands Readily Available:

  - **Samsung Pro Endurance**

  - **SanDisk Ultra, Ultra Plus, Extreme, Extreme Plus**

- **Recommendation**: Opt for a Card With >= 64GB Storage

Installing Armbian Linux ...

Libre Computer

- Use a **Bit Accurate** Copy or Flashing Tool
- **Recommendations**:
  - **Balena Etcher** (32 or 64 Bit Windows and Linux Intel)
  - Win32DiskImager (32 or 64 Bit Windows)
  - Disk Utility (macOS)
  - Linux **dd** Utility (32 or 64 Bit Linux)
- Balena Etcher used from a Windows 10 Pro PC

Installing Armbian Linux ...

Libre Computer

- Once The Micro SDXC Card is Flashed & Verified:
  - **Unmount** or **Eject** from Computer Used to Flash The SD Card
  - **Insert** the Micro SD Card into the Slot on the Le Potato SBC
  - **Power on the SBC** for the Initial Boot Up of Armbian Linux & Wait ...
- On Initial Boot **Set The Following Settings Entries** from the Command Prompt:
  - Change The **root** Password
  - Select The Terminal Shell Type (**BASH** or **ZSH**)
  - **Add a User** Account, Name and Password
  - Verify The **Timezone** and Accept **Language Setting** Based on Timezone

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Installing Armbian Linux ...

- Once All The Settings Are Computer:
    - Wait A While …
    - Computer will Start Up The **Xfce Desktop Manager**
    - **Navigation Bar** is at The Top of The Display
- **LibreOffice Suite** is Part of The Initial Installation
- **Thunar** is the File Explorer Tool
- No Java Installation with Initial Setup
- **Geany** and **Notepadqq** Are Installed for Text Editors
- **GDebi** is Installed for Additional Software Installation of Debian Packages (a bit Buggy)

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Installing Armbian Linux ...

Xfce Desktop Screenshot

Installing Open JDK 8

- Open A **BASH Shell** Prompt
  - **Applications** ==> **Terminal Emulator**
- Enter The Following Command:
  - $ **apt install openjdk-8-jdk**
- Enter **y** to Accept Installation with Related Dependencies
- To Verify The Install:
  - $ **javac -version**

Installing Open JDK 8 ...

Libre Computer

- To Make Java Available to the Current User:
  - Modify the **$HOME/.bashrc** File and Add The Following:
  - export JAVA_HOME=/usr/lib/jvm/java-8-openjdk-arm64
  - export PATH=$JAVA_HOME/bin:$PATH
- Use A Text Edit Program vs. An Office Word Processor
- **Nano**, **Geany** or **Notepadqq** will Work for Example

Installing Net Rexx 4.04

- In This Presentation I will add **NetRexx v4.04 GA** To The /opt Directory::
  - $ cd /opt
  - $ sudo mkdir netrexx
  - $ cd netrexx
  - $ sudo cp $HOME/Downloads/NetRexx-4.04-GA.zip .
  - $ sudo unzip NetRexx-4.04-GA.zip
- To **Add The NetRexx JAR Libraries to the OpenJDK 8 JRE Extensions**:
  - $ sudo cp ./lib/*.jar $JAVA_HOME/jre/lib/ext
  - $ sudo cp ./runlib/*.jar $JAVA_HOME/jre/lib/ext

Installing ooRexx 5.0

- Use One of the Following Debian Package Files From the ooRexx Source Forge Site:
  - DEB Package for Armbian Jammy: **ooRexx-5.0.0-12583.raspbianpios64.aarch64.deb**
  - DEB Package for Raspbian Bullseye: **ooRexx-5.0.0-12583.raspbianpios64.aarch64.deb**
  - DEB Package for Raspbian Buster: **ooRexx-5.0.0-12583.raspbianpios32.armv7l.deb**
- Or One Can Checkout & Build the Latest Subversion Release
- Pre-Requisite Packages Required for Build of ooRexx
  - **cmake**
  - **subversion**
  - **libncurses-dev**
- **Recommendation**: Download and **Install the Binary .deb Package for 64 Bit**
  - **sudo apt install $HOME/Downloads/ooRexx-5.0.0-12583.raspbianpios64.aarch64.deb**
- Verify the Install from the Bash Shell Prompt:
  - - $ rexx -V

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Installing ooRexx 5.0

- Sample ooRexx Program to **Measure CPU Temp**
- **Program**: rpicputemp.rex
- Checks The Temperature Value in File:
  - **/sys/class/thermal/thermal_zone0/temp**
- Utility: **vcgencmd** is Not Available for CPUs that are not Broadcom
- It is on the Raspberry Pi OS Distros, but does not Run; **VCHI Initialization Error**
- Le Potato Hardware is Not Compatible for the Broadcom RPi Userland Utilities

Installing ooRexx 5.0

- Program: rpicputemp.rex

Installing ooRexx 5.0

- Run Output: rpicputemp.rex

Installing BSF4ooRexx

- Download and Unzip Either of the Following Versions:
    - v641
    - v850
- With v850 The Jar Files can be Made Available to ooRexx
- For Java 8, Copy the BSF Binary Jar File to the $JAVA_HOME/jre/lib/ext Directory
- For Java 9 and up, Add the BSF Binary Jar File to the Java Classpath (One Solution; Other Alternatives Exist)

Findings and Recommendations

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- **Supply Chain Issues** have Resulted in **Hugely Inflated Prices** for the Raspberry PI SBCs
- **Very Few Alternatives for Under $50** USD Exist for SBCs in Today's Market
- The Libre Office 'Le Potato' is One of the Few Alternatives for an SBC Under $50 USD
- **Le Potato Compares with the Raspberry Pi 3B** in Terms of Functionality and Performances
- It **Does Not Match The Capabilities of the Raspberry Pi 4B**
- There are **More Issues with the Le Potato Hardware vs. The Raspberry Pi 3B**
- For Those **Willing To Accept Compromises** Le Potato can be used as a **Minimal Desktop Computing Environment**
- A **Lean Linux OS is a Requirement**; **Armbian** is the Best and Most Current Choice for an Linux OS Platform
- Better to Pick a **Debian Package Based Distro** such as Armbian Jammy over a Raspbian OS Conversion
- Attempted to Install **Endless OS** with No Success

Libre Computer

- Armbian Linux and Raspberry PI OS Buster (32 Bit) and Bullseye (64 Bit) Works Fairly Well with **Some Bugs Encountered**
  - **Shutdown** Would Not Work Consistently from Linux; **Rebooted** SBC Instead
  - **Workaround**: Pull Power Cord At End of Shutdown Cycle or **Add On/Off Switch to Power Supply**
  - System Would Reboot Periodically When Using The **Chromium Web Browser** on Raspberry Pi OS (Raspbian)
  - Firefox ESR Package Can Be Installed, But Does Not Run Well on Raspberry Pi OS Versions
- **Raspbian OS Conversions using a Raspberry Pi 4 Model B**
  - 64 Bit Bullseye (Debian 11 aarch64) **Works OK** with Minor Graphics Issues
  - 32 Bit Buster (Debian 10 armv7l) Works; **Package Architecture Issues Prevented Upgrade** of Linux Kernel Past v6.0
- **Little Documentation for Le Potato Exists** vs. The Raspberry Pi 3B
- It can be utilized as a **low budget SBC Desktop Environment** Utilizing a Rexx Tech Stack
- Findings with **Other Libre Computer SBCs**:
  - **Renegade**: Positive Use Experiences with 4GB Model; Better Stability vs. Le Potato (Able to Power Off SBC)
  - **Tritium**: Not Tested; Web Reports of Boot and Stability Issues with Armbian and Debian Distros

List of Web References

Libre Computer

Reference	Description	URL
Home Page of Libre Computer Project	Info Regarding Libre Computer Project	https://libre.computer/
Download Site for Armbian Linux 'Jammy' Images	URL for Getting Armbian Images for Le Potato	https://www.armbian.com/lepotato/
YouTube - Le Potato Full Setup Guide - Raspberry Pi 3 Affordable Alternative!	You Tube Video on Setting Up Le Potato SBC	https://www.youtube.com/watch?v=-d2zoc-UAuA
Wikipedia – Libre Computer Project	Info About Libre Computer Project	https://en.wikipedia.org/wiki/Libre_Computer_Project#Software_2

List of Web References ...

Libre Computer

Reference	Description	URL
Product Info Le Potato SBC	Info Regarding Le Potato SBC	https://libre.computer/products/s905x/
Le Potato vs. The Raspberry Pi 3 Model B	Performance and Power Consumption -S905X-CC (Le Potato) vs/ Raspberry Pi 3 Model B	https://libre.computer/blogs/performance-and-power-consumption-comparison-for-aml-s905x-cc-le-potato-and-raspberry-pi-3-model-b/
First Look at Libre Computer Board AML-S905X-CC (Le Potato) - Hardware OVerview	LoveRPi Blog Article on Le Potato SBC	https://www.loverpi.com/blogs/news/first-look-at-libre-computer-board-aml-s905x-cc-le-potato-hardware-overview
Le Potato – Available Linux Distros	OS Platform Options for SBCs	https://www.libre.computer/downloads/aml-s905x-cc/

List of Web References ..

Reference	Description	URL
Libre Computer Le Potato SBC Review	James A Chambers Tech Blog Review of SBC with I/O Benchmarks	https://jamesachambers.com/libre-computers-le-potato-sbc-review/
Enable Raspbian Images to Boot on Libre Computers Board	James A Chambers Tech Blog Guide to Converting Raspbian OS for Le Potato using a R Pi	https://jamesachambers.com/enable-raspbian-images-to-boot-on-libre-computers-boards/
Rexxinfo – Rexx CPS Benchmark Numbers for Le Potato	Rexx Clauses/Second Benchmarks for ooRexx 5 & Regina v3.9.5	http://rexxinfo.org/links/articles/benchmarking.html
Rexxinfo – How to Install Rexx on the Raspberry Pi	HW and Linux How Tos for Setting Up ooRexx	http://rexxinfo.org/info/articles/rpi_rexx_tony_dycks.pdf

Acknowledgments

Libre Computer

- **James A. Chambers** – For His **Tech Blog Articles** on the '*Le Potato'* SBC

- **Per Olov Jonsson** – For His Efforts to Build Binary Images for the **Raspbian OS Dialects of ooRexx 5.0** via Jenkins

- **Howard Fosdick** – Published Rexx CPS Benchmarks Now Available on the Updated **rexxinfo.org** Website using Regina and ooRexx

- **Armbian Project** – For Providing **Up to Date Kernel Linux Distros for SBCs** Other Than Raspberry Pis

End of Presentation

- **Questions?**

- **Comments?**

- **Copy of Slides Available on the Rexx LA Website**