

# Implementing Rexx on the Libre Computer 'Le Potato' SBC



**2023 Rexx Language Association Symposium**

**Author: Tony Dycks**

**Last Revised: May 15, 2023**



# Overview


- 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

- 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

- 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 ...

- 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

- **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)



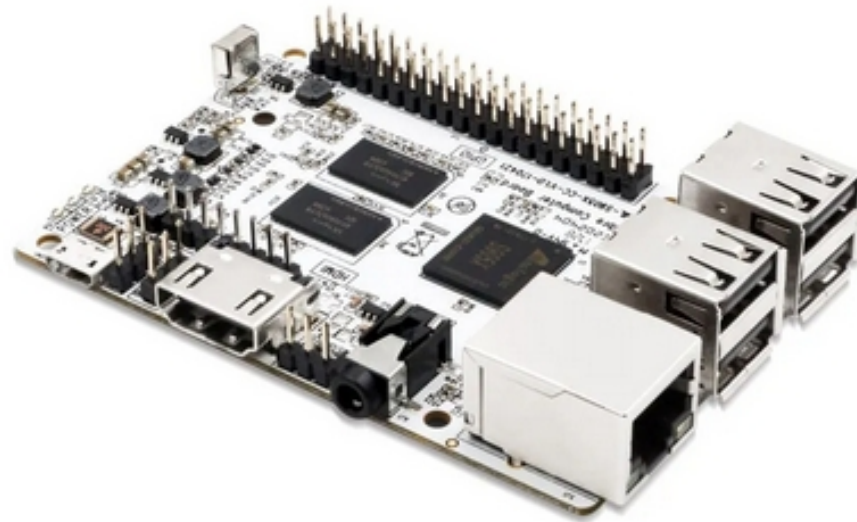
# Le Potato vs. Raspberry Pi 3B

- 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

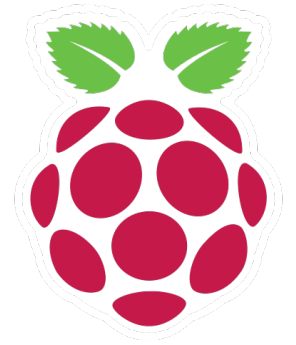


# Le Potato vs. Raspberry Pi 3B

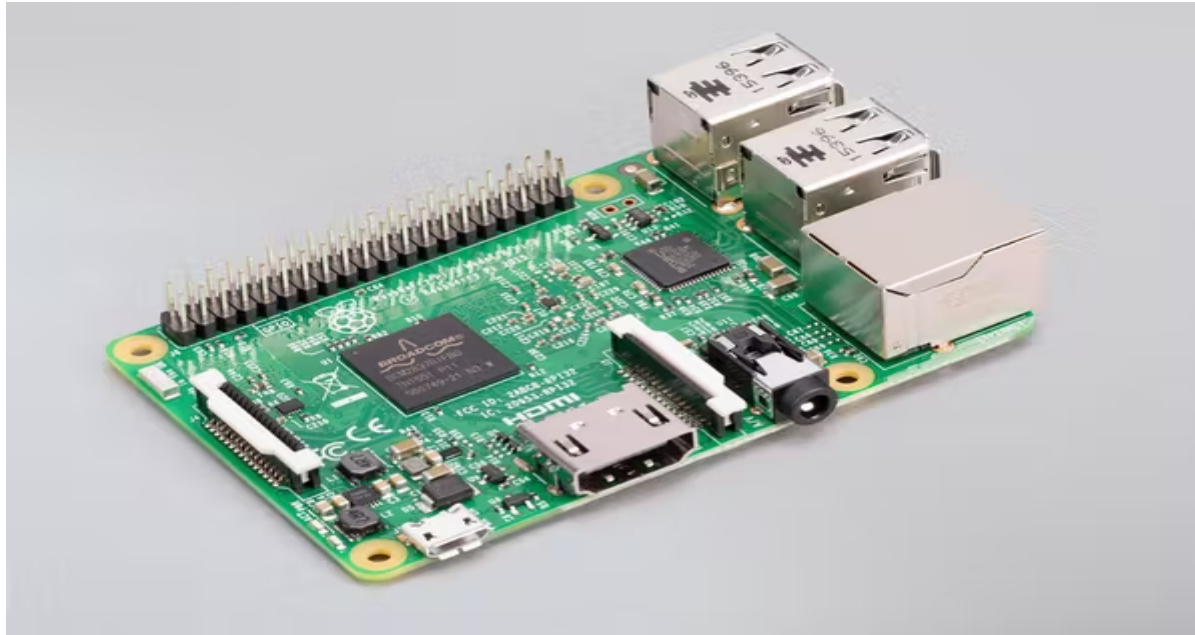
- LoveRPI Heat-sink for Le Potato SBC Screenshot



# Le Potato vs. Raspberry Pi 3B



- Raspberry Pi 3B SBC Screenshot



# Le Potato vs. Raspberry Pi 3B

- iUniker Raspberry Pi 3B Case Screenshot



# Installing Armbian Linux

- 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](https://redirect.armbian.com/lepotato/Jammy_current_xfce)
- Le Potato CLI Current Download URL:
- [https://redirect.armbian.com/lepotato/Jammy\\_current](https://redirect.armbian.com/lepotato/Jammy_current)

- 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  $\geq$  64GB Storage



# Installing Armbian Linux ...

- 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 ...

- 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

# 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)

# 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 ...

- 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



# Installing ooRexx 5.0

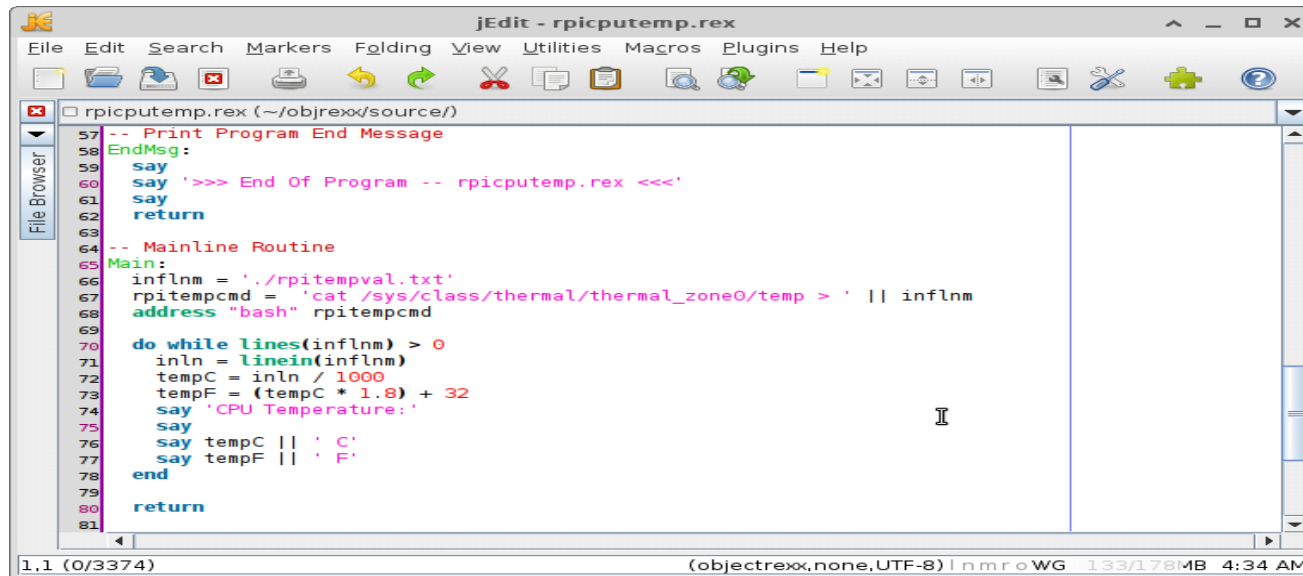


- Sample ooRexx Program to **Measure CPU Temp**
- **Program:** rpicputemp.rex
- Checks The Temperature Value in File:
  - **`/sys/class/thermal/thermal_zone0/temp`**
- Utility: **vcgencmd** is Not Available for CPUs that are not Broadcom
- It is on the Raspberry Pi OS Distros, but does not Run; **VCHI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

# Installing ooRexx 5.0



- Program: rpicputemp.rex



```
jEdit - rpicputemp.rex
File Edit Search Markers Folding View Utilities Macros Plugins Help
[Icons]
[File Browser]
rpicputemp.rex (~/.objrexx/source/)
57 -- Print Program End Message
58 EndMsg:
59   say
60   say '>>> End Of Program -- rpicputemp.rex <<<'
61   say
62   return
63
64 -- Mainline Routine
65 Main:
66   inflnm = './rpitempval.txt'
67   rpitempcmd = 'cat /sys/class/thermal/thermal_zone0/temp > ' || inflnm
68   address "bash" rpitempcmd
69
70   do while lines(inflnm) > 0
71     inln = linein(inflnm)
72     tempC = inln / 1000
73     tempF = (tempC * 1.8) + 32
74     say 'CPU Temperature:'
75     say
76     say tempC || ' C'
77     say tempF || ' F'
78   end
79
80   return
81
1,1 (0/3374) (objectrexx,none,UTF-8) | n m r o W G 133/178MB 4:34 AM
```

# Installing ooRexx 5.0



- Run Output: rpicputemp.rex

```
tonyd@lepotato: ~/objrex/source
tonyd@lepotato: ~/objrex/source 80x24
rpicputemp.rex
Display the Raspberry Pi CPU Temperature in Both Celsius & Fahrenheit
Version 1.0
Written By: Tony Dycks
Revised By: Tony Dycks
Date Written: July 28, 2020
Last Revised: July 28, 2020

CPU Temperature:

46 C
114.8 F

>>> End Of Program -- rpicputemp.rex <<<
tonyd@lepotato:~/objrex/source$
```

# 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

- **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

# Findings and Recommendations

- 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

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

# List of Web References ...

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



# 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	<a href="https://jamesachambers.com/libre-computers-le-potato-sbc-review/">https://jamesachambers.com/libre-computers-le-potato-sbc-review/</a>
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	<a href="https://jamesachambers.com/enable-raspbian-images-to-boot-on-libre-computers-boards/">https://jamesachambers.com/enable-raspbian-images-to-boot-on-libre-computers-boards/</a>
Rexxinfo – Rexx CPS Benchmark Numbers for Le Potato	Rexx Clauses/Second Benchmarks for ooRexx 5 & Regina v3.9.5	<a href="http://rexinfo.org/links/articles/benchmarking.html">http://rexinfo.org/links/articles/benchmarking.html</a>
Rexxinfo – How to Install Rexx on the Raspberry Pi	HW and Linux How Tos for Setting Up ooRexx	<a href="http://rexinfo.org/info/articles/rpi_rexx_tony_dycks.pdf">http://rexinfo.org/info/articles/rpi_rexx_tony_dycks.pdf</a>

# Acknowledgments



- **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

