Resources for Developing Open Source Software for Linux on IBM Z and LinuxONE

ELIZABETH K. JOSEPH, DEVELOPER ADVOCATE

@PLEIA2

13 JANUARY 2022
IBM Z / s390x / zArchitecture

190 5.2ghz processor units (PUs), with 12 cores per chip

But also...

40TB of RAM

60 PCIe control units across 12 PCIe I/O drawers

22 dedicated I/O offload processors (SAPs) pre-allocated per system
Upcoming: Telum Processor


Terminal Talk: "Christian Jacobi tells us all about Telum" [https://www.terminaltalk.net/e/christian-jacobi-tells-us-all-about-telum/]

The IBM Telum Processor Design

- **Performance and Scale**
  - Optimized core
  - New cache hierarchy & multi-chip fabric

- **Embedded Accelerators**
  - Sort, Compression, Crypto
  - AI

- **Industry-leading Security**
  - Encrypted Memory
  - Improved Trusted Execution Environment

- **Unmatched Reliability and Availability**
  - L2 cache SRAM wipe-out error correction & sparing
  - 8-DIMM Redundant Array of Memory (RAIM)
Started out as the "Bigfoot" (i370) port by several community members in 1998-99.

IBM released the first Linux kernel patches to support s390x in December 1999.

In October 2000, SUSE Linux Enterprise Server (SLES) became the first, still in production, enterprise Linux to support s390x.

Red Hat Enterprise Linux (RHEL) quickly followed as the second, still in production, enterprise Linux for the mainframe.

Ubuntu support was announced in 2016 and began with Ubuntu 16.04.
Announced at the Linux Foundation’s LinuxCon 2015, IBM released the first Linux-only mainframe, the IBM LinuxONE.

Today’s LinuxONE is in its third iteration, with the LinuxONE III released in September 2019.
IBM Z has an open source legacy!

- In 1955, The Volunteer-Run SHARE Inc was founded.
- A key resource for this organization was the SHARE library of software that systems programmers would share among their peers, freely.
- In 1959, SHARE released the SHARE operating system (SOS), one of the first true "operating systems". Wikipedia says of SOS:
  - "SOS was one of the first instances of "commons-based peer production" now widely used in the development of free and open-source software such as Linux and the GNU project."

1 HTTPS://EN.WIKIPEDIA.ORG/WIKI/S hare_(C omputing)
Are other projects porting their apps?

Yes!
Finding Open Source Software for Linux

- Search distributions with the Open Mainframe Project Software Discovery Tool [https://www.openmainframeproject.org/projects/software-discovery-tool](https://www.openmainframeproject.org/projects/software-discovery-tool)
- Go directly to the project, do they have s390x builds?
- Ask your vendor, is there a port they maintain?
Full project hosting, including code, and mailing lists

Blogs and podcasts of general interest to the open source mainframe community

Slack and forums for communication among participants

Project support for 3rd party open source projects seeking infrastructure (VMs, CI/CD services)

Annual conference!
IBM LinuxONE Community Cloud

"The IBM LinuxONE Community Cloud is a no-charge, 24 x 7, enterprise-grade, open access, shared public cloud environment on IBM's LinuxONE platform. Developers, students, professors, entrepreneurs, or anyone from all over the world can sign up for 120-day access to a virtual server with full access to develop, test, or run open source applications on LinuxONE, or to access any of the other services offered."

Visit https://developer.ibm.com/linuxone to get started

And join the LinuxONE Community Cloud Community at https://www.ibm.com/community/z/linuxone-cc/
Ubuntu Personal Package Archives (PPAs) on Launchpad.net

Documentation: https://help.launchpad.net/Packaging/PPA
openSUSE build service at build.opensuse.org

---

A fast compressor/decompressor library

Snappy is a compression/decompression library. It does not aim for maximum compression, or compatibility with any other compression library; instead, it aims for very high speeds and reasonable compression. For instance, compared to the fastest mode of zstd, Snappy is an order of magnitude faster for most inputs, but the resulting compressed files are anywhere from 20% to 100% bigger. On a single core of a Core i7 processor in x86-64 mode, Snappy compresses at about 250 MB/sec or more and decompresses at about 500 MB/sec or more.

Do NOT submit it to factory without asking or the package will be yours to maintain.

<table>
<thead>
<tr>
<th>Source Files</th>
<th>show unmerged sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Size</td>
</tr>
<tr>
<td>1.1.tar.gz</td>
<td>104 MB</td>
</tr>
<tr>
<td>basebin.conf</td>
<td>11 Bytes</td>
</tr>
<tr>
<td>snappy-pchla.patch</td>
<td>2.43 KB</td>
</tr>
<tr>
<td>snappy.changes</td>
<td>4.53 KB</td>
</tr>
<tr>
<td>Snappy.spec</td>
<td>3.07 KB</td>
</tr>
</tbody>
</table>

Showing 1 to 5 of 5 entries

Latest Revision

- Mark Post (markwp) committed 4 days ago (revision 1)
- Browse Source

OpenSUSE Build Service

- SLE_12_SP2
- SLE_12_SP3
- SLE_12_SP4
- SLE_15
- openSUSE_Factory
- openSUSE_Factory_ARM
- openSUSE_Factory_PowerPC
- openSUSE_Factory_x86_64
- openSUSE_Leap_15.0
- openSUSE_Leap_15.1
- openSUSE_Leap_42.3
Jenkins instance for s390x maintained by the Oregon State University Open Source Lab (OSU OSL)

https://osuosl.org/services/ibm-z/
TravisCI build service for s390x (Beta trial for open source projects)

Documentation: https://docs.travis-ci.com/user/multi-cpu-architectures/
So, any programming language?
Programming Language Tips

Source code across architectures will generally be identical, but it needs to be compiled (C, C++), or otherwise interpreted (Python, Node.js) for this architecture.

That means you need a compiler or an interpreter built for the mainframe. The mainframe architecture is big-endian, but most of the supported architectures today are little-endian.

Your code will probably build and run, give it a try!

If not, note that the higher level a language is, the more luck you'll have. Lower level languages like C do more hardware-specific operations, higher level languages like Node.js have much of that abstracted away.
Questions?

Elizabeth K. Joseph
lyz@ibm.com
@pleia2

Join us in the IBM Z Community:

https://www.ibm.com/community/z/open-source/