Linux Distribution Collaboration ... on a Mainframe!

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What is a mainframe?
What is a mainframe?

Max setup in a 4-frame system:
- 4 Central Processor Complex (CPC) drawers
  - 200 processor cores
  - 40TB of memory
- 12 I/O drawers
What is a mainframe?

• IBM Telum chip
  • New on-chip Integrated Accelerator for AI
  • On-chip Compression/decompression
  • CP Assist for Cryptographic Functions (CPACF) in each core
  • Fully redesigned cache system (and it's BIG!)

2 IBM Telum chips on an IBM z16 Dual Chip Module (DCM)
What is a mainframe?

• And Linux runs on them!
  • (it has for over 20 years)

...some of them only run Linux.
Hardware Architectures

- **amd64** – 64-bit x86
  - standard laptop, desktop, server
- **arm64** – 64-bit ARM
  - state of the art ARM-drivered servers, modern cellphones, Raspberry Pi 3 & 4, Apple M1 & M2, some Chromebooks
- **ppc64(le)** – 64-bit PowerPC
  - IBM POWER & openPOWER-driven servers, Wii U, PS3, Xbox 360
- **s390x**
  - IBM Z and LinuxONE (mainframes)

And open source projects can release on various architectures, for example:

Download Kubernetes
An easier way to get the binaries you need (or a link to them)
Why support lots of architectures?

- Expand direct user base
- Meet expectations of projects that depend upon yours
- Satisfy technical curiosity
- Expand skills/expertise
Things you need to consider

- Access to servers or hardware emulators, depending on the project
- Management of bugs/issues
  - Little endian vs. Big endian (memory addressing) issues
  - Installation and internal scripts that make assumptions about architecture
- Dependency management/support
- Domain expertise
But we can help!

https://wiki.openmainframeproject.org/display/LinuxDistrosWG
The Open Mainframe Project was founded in 2015, as a focal point for deployment and use of Linux and Open Source in a mainframe computing environment.

The Open Mainframe Project is part of the Linux Foundation.

https://openmainframeproject.org/
Launched in 2021 with the following purpose:

To oversee the health and maintenance of the s390x port of various Linux distributions to ensure that the s390x port remains a supported architecture for them all.

To this end, the group will collaborate on shared challenges and successes, work together to nurture new contributors, and make sure they also have the infrastructure they need.
Aside: What about the "distro wars"?

- That's mostly the users
- Developers of the various Linux distributions have always collaborated
  - "Upstream" in software projects they all include in their distributions
  - Shared security disclosure mailing lists
  - Knowledge sharing at industry events (like ATO!)
  - SIGs, and WGs, like us!
How it works

• We largely collaborate via mailing list and monthly team meetings to discuss:
  • Outstanding issues of note that may impact others
  • Efforts and strategies to resolve issues
  • Sharing of patches
  • Help with infrastructure requirements
  • Porting efforts at IBM from various tools teams
• Just launched a forum on the Open Mainframe Project discourse forum for additional input and user feedback
At a team meeting, Sarah Julia Kriesch of openSUSE brought up a build issue, Dan Horák of Fedora has a patch!

- Remote desktop xrdp client isn't building on openSUSE: https://build.opensuse.org/package/live_build_log/openSUSE:Factory:zSystems/xrdp/standard/s390x (the server is fine, which is the more common use case)
  - Ulrich checked - upstream claims to support it, a patch went in in March 2021
  - FYI Fedora patch: https://src.fedoraproject.org/rpms/xrdp/blob/rawhide/f/xrdp-0.9.16-arch.patch
Dan Horák of Fedora brings an issue with LDC to the group on the mailing list, and Ulrich of the tools team at IBM starts looking into it.
Elizabeth K. Joseph of IBM learned via social media that Alpine Linux was at risk of dropping their s390x port due to issues with rustbuild, brought it up at a team meeting, and Ulrich's team jumped in.

**drop s390x**

Rust is increasingly a dependency for key Alpine components, and Rust does not work on s390x.

In addition, Alpine is not getting sufficient community interest to keep the port in good shape (I am pretty much the only one working on it these days), while there is no engineering support from IBM for the port.

As such, I would like to propose decommissioning the port, unless the TSC approves a plan to keep it going that involves IBM and other stakeholders.

Incidentally, a quick poll of known downstream consumers (e.g. Kubernetes Ingress) of Alpine s390x did not indicate that s390x support was terribly important to them.
Dan Horák of Fedora brought up a bug on the mailing list with openJDK, it was discussed at a meeting, and Tyler Steele of IBM wrote a patch that fixed it.
What else?

- device interrupts for virtual card readers that were ignored by the kernel (patch in the works!)
- Expanded D language support
- Possible shared customer/client implementations or requirements around DPDK to garner more resources
- .NET 7 availability being worked on by multiple distributions (started with RHEL)
- libc++: First time, that the package build for s390x is successful on openSUSE
- frame pointer option enabling (already forwarded and approved with some changes)
- Ongoing fixes for Redpanda support
- OpenMPI build errors
- Issues with btrfs-progs which have now been fixed upstream
- Neovim LuaJIT support not activated for s390x upstream (ongoing)
- WebKit: Crashes and infinite recursion in JSC::LLInt::CLoop::execute on s390x
- kubernetes ingress-nginx considering dropping s390x
Collaborative development of automated tests for openQA

- Sub project for automated testing by openSUSE
- AlmaLinux has contributed RH KVM tests for s390x to openQA repositories
- RockyLinux has followed after the announcement

http://open.qa/
Welcome to AlmaLinux openQA
Life is too short for manual testing!

AlmaLinux Prerelease x86_64
- Build-AlmaLinux-9.3-beta1-x86_64-20231011.202712 (2 days ago)
  - 16 passed
  - 9 failed
  - 23 skipped

AlmaLinux Prerelease AArch64
- Build-AlmaLinux-9.3-beta1-aarch64-20231011.210307 (2 days ago)
  - 36 passed
  - 0 failed

AlmaLinux Prerelease ppc64le
- Build-AlmaLinux-9.3-beta1-ppc64le-20231011.211119 (2 days ago)
  - 36 passed
  - 12 failed

AlmaLinux Prerelease s390x
- Build-AlmaLinux-9.3-beta1-ppc64le-20231011.211950 (2 days ago)
  - 8 passed
  - 5 failed
  - 1 skipped

[https://openqa.almalinux.org/](https://openqa.almalinux.org/)
Project Resources:

• Wiki: https://wiki.openmainframeproject.org/display/LinuxDistrosWG
• Mailing list: https://lists.openmainframeproject.org/g/wg-linux-distros
• #linux-distros-wg on Open Mainframe Project Slack
• Forum: https://community.openmainframeproject.org/c/linux-s390x
Access to s390x development resources

As a developer of an open source software project, this site provides an overview of the technical resources available free of charge for developers seeking to build for Linux on IBM Z:

- [https://openmainframeproject.org/news/developer-resources-for-linux-on-s390x/](https://openmainframeproject.org/news/developer-resources-for-linux-on-s390x/)
- Linux VMs from IBM (temporary and permanent)
- Jenkins service from the OSU OSL
- Travis CI build service
- CircleCI self-hosted runner binaries
- openSUSE Build Service
- Launchpad Personal Package Archives
Questions? Comments?

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