

Open Source & IBM Z

—



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Debian / Ubuntu



OpenStack



Apache Mesos



Linux on Z



What is a mainframe?

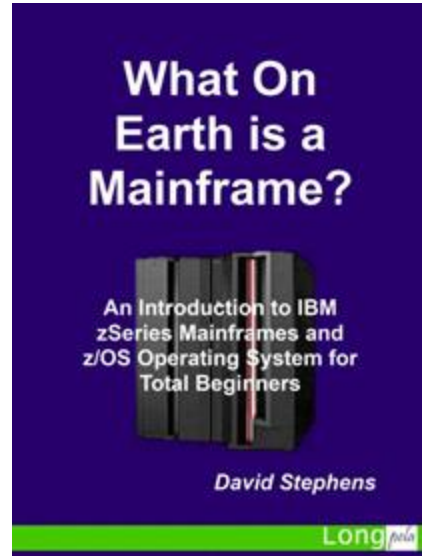
Depends on who you ask.

Traditionally runs z/OS, but increasingly Linux too.

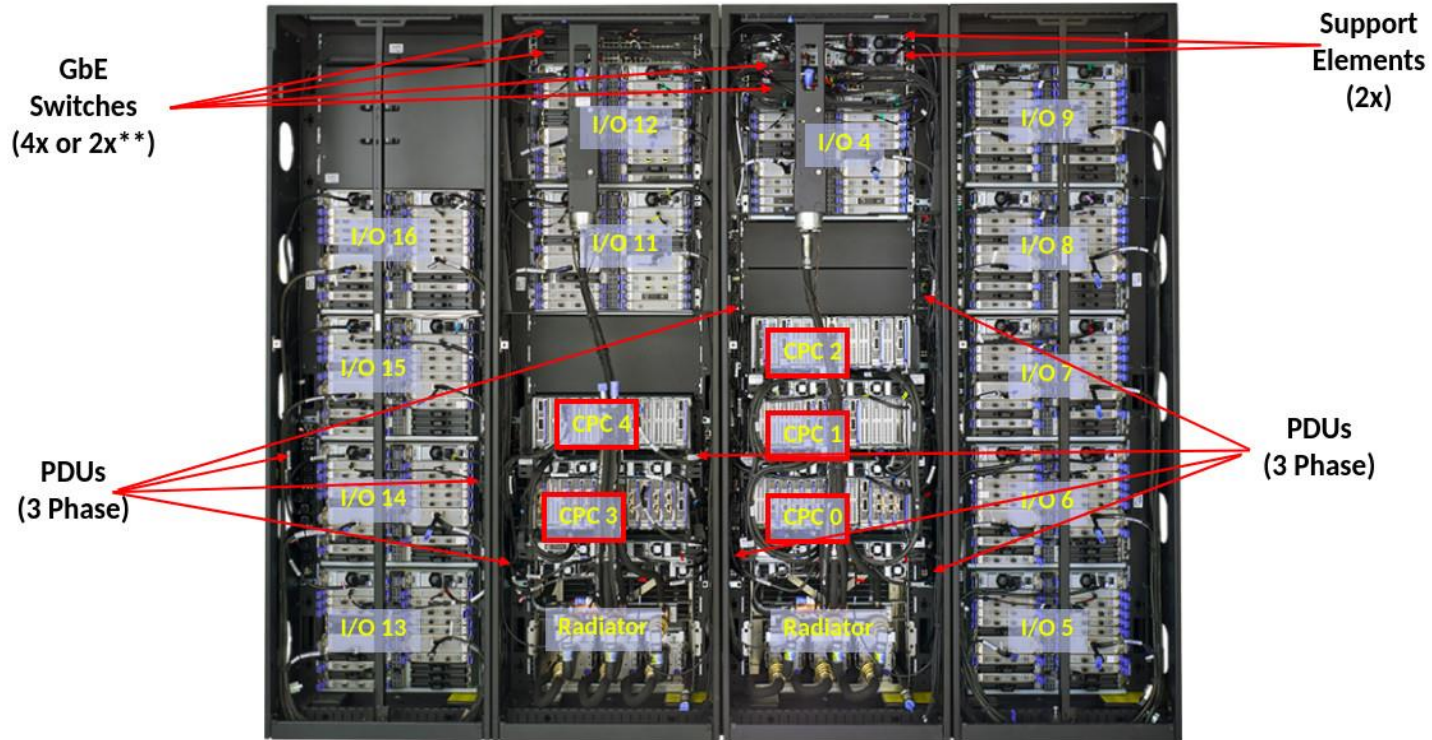
Data, data, data.

Batch processing!

Enterprise-grade hardware
and storage.

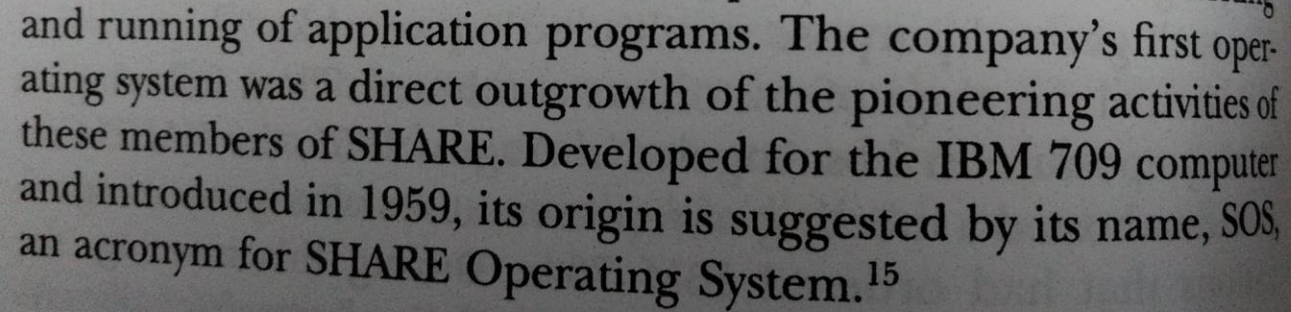


What is a mainframe?



SHARE

"a volunteer-run user group for IBM mainframe computers that was founded in 1955 by Los Angeles-area users of the IBM 701 computer system" via [https://en.m.wikipedia.org/wiki/SHARE_\(computing\)](https://en.m.wikipedia.org/wiki/SHARE_(computing))

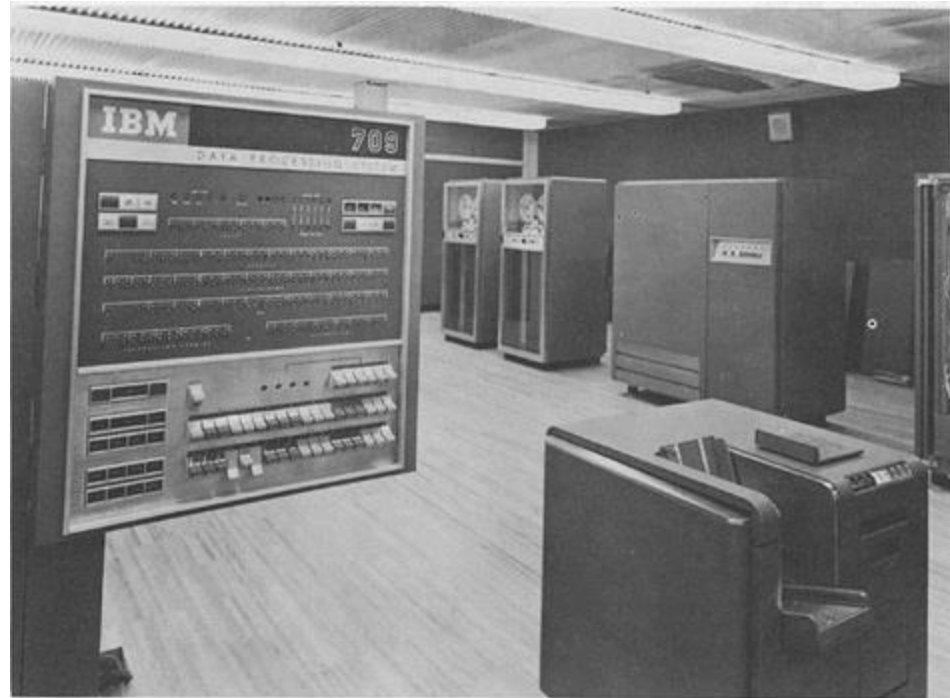
A photograph of a document page with text about the SHARE Operating System. The text is slightly tilted and appears to be from a book or a scanned document. The text reads: "and running of application programs. The company's first operating system was a direct outgrowth of the pioneering activities of these members of SHARE. Developed for the IBM 709 computer and introduced in 1959, its origin is suggested by its name, SOS, an acronym for SHARE Operating System.¹⁵"

and running of application programs. The company's first operating system was a direct outgrowth of the pioneering activities of these members of SHARE. Developed for the IBM 709 computer and introduced in 1959, its origin is suggested by its name, SOS, an acronym for SHARE Operating System.¹⁵

Source: Building IBM, by Emerson Pugh

Once upon a time
mainframes lacked
time-sharing

Papers discussing time-sharing
were published as early as
1959, but Compatible Time-
Sharing System (CTSS) was
first demoed by MIT on an IBM
709 in 1961.



Several iterations later... VM/370, in 1972



Want to know about all those iterations? Melinda Varian has published a fascinating history, available in several formats, on her website: <http://www.leeandmelindavarian.com/Melinda/>

Through the 80s and 90s

Community thrived, along with the technology and support from IBM.

In 1994 experimental TCP/IP support was added to VM, adding a key component to supporting Linux 5 years later.

Linux Origins: Bigfoot

Developed by Linus Vepstas in 1998-1999 as a community effort.

“the **Bigfoot (i370)** port was started first, but is currently stagnant for essentially political, social, and market reasons.”

Source: Linus Vepsta’s site on Linux on s390

<https://linas.org/linux/i370.html>

Why did the community want it?

“Why? Good question. One we've asked ourselves many times. Why do you do the things you do? If you think about it, you can probably find a hundred rationalizations for what your gut makes you to do. Here's some of ours:

- Stunt
- To Learn
- Because Its There
- Because Its Knarly, Duude!
- I/O
- Address Spaces and Access Lists
- VM
- The Business Model”

Source: <https://linas.org/linux/i370-why.html>

Linux Origins: Linux for S/390

Linux for S/390 began when “IBM published a collection of patches and additions to the Linux 2.2.13 kernel on December 18, 1999, to start today's mainline Linux on Z. Formal product announcements quickly followed in 2000”

Marist File System was the first Linux distro put together out of Marist College in Poughkeepsie, NY. Think Blue Linux by Millenux in Germany was an early distro with Red Hat packages and the IBM kernel for mainframes. Other commercial editions quickly followed.

Source: https://en.wikipedia.org/wiki/Linux_on_z_Systems

This is the current, actively developed iteration that all the major platforms are part of today.

Why did IBM want it?



IBM "Heist" commercial, 2001 <https://www.youtube.com/watch?v=uxg17JlyFas>

S/390: The Linux Dream Machine

Linux Everywhere: More than a Slogan

Scott Courtney

Wednesday, February 23, 2000 09:19:48 AM

Let's play a word association game, shall we? The first word is "mainframe."

Many Linux enthusiasts were born and bred in an era of PCs that are already fast and even administrators of large-scale servers are reluctant to spend seven figures on Big "mainframe," there's a good chance that some of the words that came to mind were:

ComputerWorld (Denmark): Linux on IBM S/390 mainframe

Oct 12, 1999, 01:52 UTC (19 Talkbacks) (Other stories by [J.O.S. Svendsen](#))

[*Linux Today* reader [Hans Schou](#) writes:]

"Friday 8 october 1999 there was a story in the Danish Computerworld about IBM had ported Linux to the S/390 mainframe.

For some people this would not be amazing, as there was a posting to the Linux Kernel list back in march 1999, where a guy asked about DMA buffers and address space. The posting came from 3dlabs.com and the rumor began that IBM was porting Linux to mainframe.

I called IBM today and they confirmed that the development was going on, but they did



Dr. Dob's

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GO TO.....

Linux/390 in the Spotlight at SHARE 94

by Jack J. Woehr

The atmosphere at SHARE 94 in Anaheim, California was nerdy beyond the ability of mere Unix hackers to imagine. Big draws at the conference, held March 5-10, 2000 at the Anaheim Hilton and Marriott, included sessions examining the latest updates to S/390 assembler programs and exhibits of computers the size of walk-in closets. Attendees included over three thousand members and scores of vendors displaying

[About Linux/390](#)
[About System 390](#)
[About Open Edition](#)

20 Years of Linux

Networking

Between Linux LPARs, HiperSocket is used for communication between VMs rather than TCP/IP for speed, responsiveness and reliability.

Storage

Linux can connect and interface with to the storage servers, like the DS8880 and DS8888.

Portions of Linux rewritten to take advantage of hardware I/O capabilities reducing load from the Central Processor (CP).

Processors

Linux can run on the traditional mainframe Central Processor (CP), but there's also an Integrated Facility for Linux (IFL) processor with some instructions disabled that are used only by z/OS.

Open Source

There are few barriers to compiling for s390x (though it is big-endian), so new open source software is being compiled for the platform every day.

Validated open source software list:

<https://www.ibm.com/developerworks/community/forums/html/topic?id=5dee144a-7c64-4bfe-884f-751d6308dbdf>

LinuxONE

2015, 2017, 2019



Official Distributions



But also...

- Debian
- Fedora
- Slackware
- CentOS (ClefOS)
- Gentoo

Distributions

Hypervisors

PaaS / IaaS

Languages

Runtimes

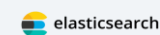
Management

Database

Analytics



LPA
R



Community Versions

IBM Cloud Private



LLVM



DPM



SCYLLA



Db2

Some cool things I learned



Elizabeth K. Joseph
@pleia2

And Docker has an architecture option under platform.

You can build identical containers across your environment, and when you need to offload to a different environment it's pretty easy to automate.

```
image: webapp:latest
manifests:
-
  image: webapp-s390x
  platform:
    architecture: s390x
    os: linux
-
  image: webapp-amd64
  platform:
    architecture: amd64
    os: linux
```

9:33 AM · May 28, 2019 · Twitter Web Client

<https://twitter.com/pleia2/status/1133410939523411968>

<https://hub.docker.com/u/s390x/>



Elizabeth K. Joseph
@pleia2

I bet you can imagine how excited I am about this 😊

I'll be at #GitHubUniverse tomorrow with the Travis folks and my #IBMPower peers talking about why you might want to build your software for #IBMZ!
#mainframes



Travis CI @travisci · Nov 12

🔥 We're excited to share that you can now build your projects on IBM Power and IBM Z CPU architectures 🚀

Thanks to the partnerships with @IBMPowerSystems @IBMZ and @Canonical you're able to test your open source projects for free.

Learn more at blog.travis-ci.com/2019-11-12-mul...

Multiple CPU architectures

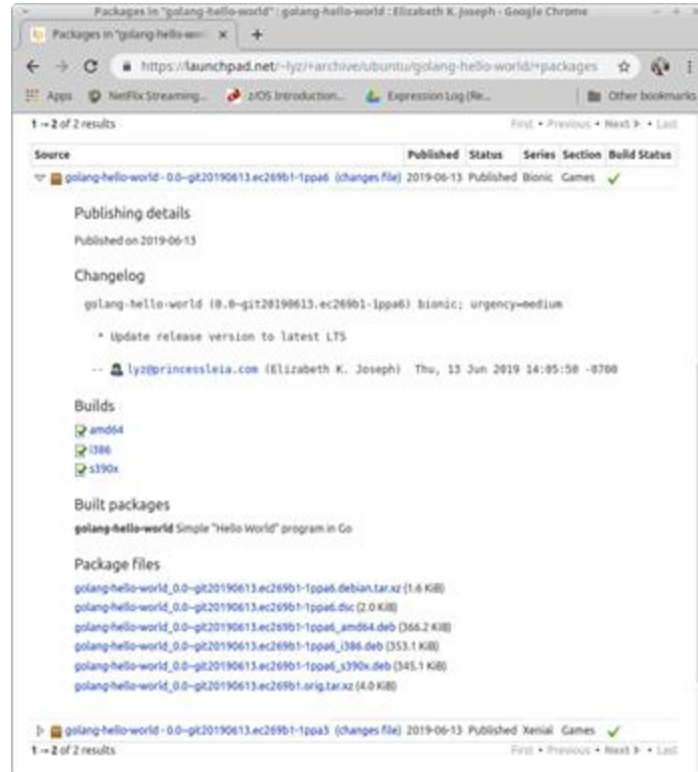
Test your software on multiple CPU architectures.

Travis CI

11:18 AM · Nov 12, 2019 · Twitter Web App

<https://twitter.com/pleia2/status/1194333695651434496>

Self-Service s390x: Ubuntu PPAs



See: <https://princessleia.com/journal/2019/06/building-a-ppa-for-s390x/>

Self-Service s390x: openSUSE Build Service

The screenshot shows the openSUSE Build Service web interface for the 'snappy' package. The page includes navigation links (Downloads, Support, Community, Development), a search bar, and a 'Sign Up | Log In' link. The main content area features a description of 'snappy' as a fast compressor/decompressor library, a 'Source Files' table, and a 'Build Results' section.

Source Files (show unmerged sources)

| Filename | Size | Changed | Actions |
|---------------------|----------|------------|--------------------------|
| 1.1.7.tar.gz | 1.04 MB | 2018-02-08 | Download |
| baseelbs.conf | 11 Bytes | 2015-07-29 | Download |
| snappy-pcfile.patch | 2.43 KB | 2018-02-08 | Download |
| snappy.changes | 4.53 KB | 2018-02-08 | Download |
| snappy.spec | 3.07 KB | 2018-02-08 | Download |

Showing 1 to 5 of 5 entries

Latest Revision

Mark Post (markip) committed 8 days ago (revision 1)

[Browse Source](#)

Build Results

snappy

| Build | Architecture | Status |
|---------------------------|--------------|------------|
| SLE_12_SP2 | x86_64 | failed |
| SLE_12_SP3 | aarch64 | successful |
| | ppc64le | successful |
| | s390x | successful |
| | x86_64 | successful |
| SLE_12_SP4 | aarch64 | successful |
| | ppc64le | successful |
| | s390x | successful |
| | x86_64 | successful |
| SLE_15 | s390x | successful |
| openSUSE_Factory | i586 | successful |
| | x86_64 | successful |
| openSUSE_Factory_ARM | armv7l | successful |
| | aarch64 | successful |
| openSUSE_Factory_PowerPC | ppc64 | successful |
| | ppc64le | successful |
| openSUSE_Factory_zSystems | s390x | successful |
| openSUSE_Leap_15.0 | x86_64 | successful |
| openSUSE_Leap_15.1 | x86_64 | successful |
| openSUSE_Leap_42.3 | x86_64 | successful |

Source: <https://build.opensuse.org/>

LinuxONE Community Cloud

The IBM LinuxONE Community Cloud provides a no charge, self-provisioned SUSE or Red Hat virtual machine on an IBM LinuxONE Enterprise Server (s390x architecture) to develop, test, and run your apps.

<https://developer.ibm.com/linuxone>



Open Mainframe Project



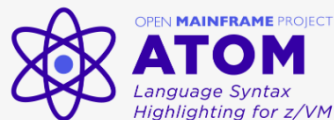
Zowe

Zowe is a new open source software framework that provides solutions that allow development and operations teams to securely, manage, control, script and develop on the Mainframe like any other cloud platform. Zowe is the first open source project based on z/OS.



Anomaly Detection Engine for Linux Logs (ADE)

ADE detects anomalous time slices and messages in Linux logs (either RFC3164 or RFC5424 format) using statistical learning.



Atom language syntax highlighting for z/VM

Helping connect the next generation with mainframe and open source, the internship program has helped students over the past several years become contributors to open source on mainframe, as well as develop the skills for a long career in technology.



Feilong

Feilong is an open source z/VM cloud connector project under the Open Mainframe Project umbrella that will accelerate the z/VM adoption, extending its ecosystem and its user experience.



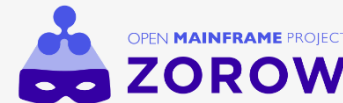
Mentorship Program

Helping connect the next generation with mainframe and open source, the mentorship program has helped students over the past several years become contributors to open source on mainframe, as well as develop the skills for a long career in technology.



TerseDecompress

TerseDecompress helps mainframe users uncompress files on any workstation.



Zorow

z/OS Open Repository of Workflows (zorow), is dedicated to contributing and collaborating on z/OSMF workflows.

More details at <https://www.openmainframeproject.org/>

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21 NOVEMBER 2019

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IBM Z: Imagine this - IBM Z runs 30 billion transactions a day! Always open | on | secure. To provide perspective, there are approximately 5.6 billion Google searches per day. Want to know how? Join us!

Open Z: Open source technologies are a vital part of most technology strategies today and this track provides attendees with a look at how they are being used for both zOS and LinuxONE.

Global Z: Join tech influencers, international organizations like the World Economic Forum and the United Nations, and IBM enterprise and startup clients to hear how they are shaping the digital landscape and evolving the tech industry, while making the world a better place.

