Open Source on the Mainframe in 1960, 1999, and Today

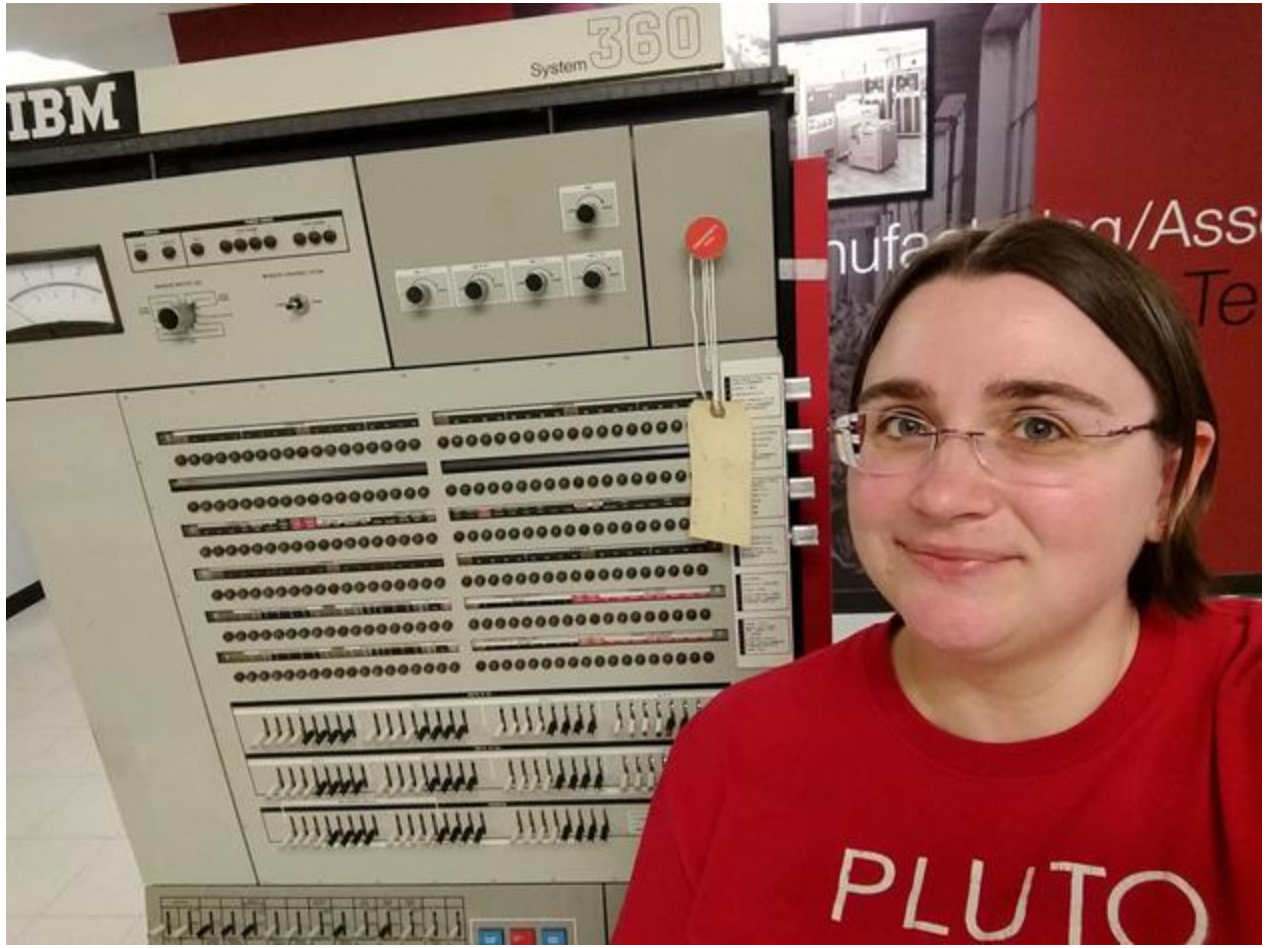
Elizabeth K. Joseph, IBM
@pleia2

SeaGL 2020

$ whoami

Elizabeth K. Joseph, @pleia2

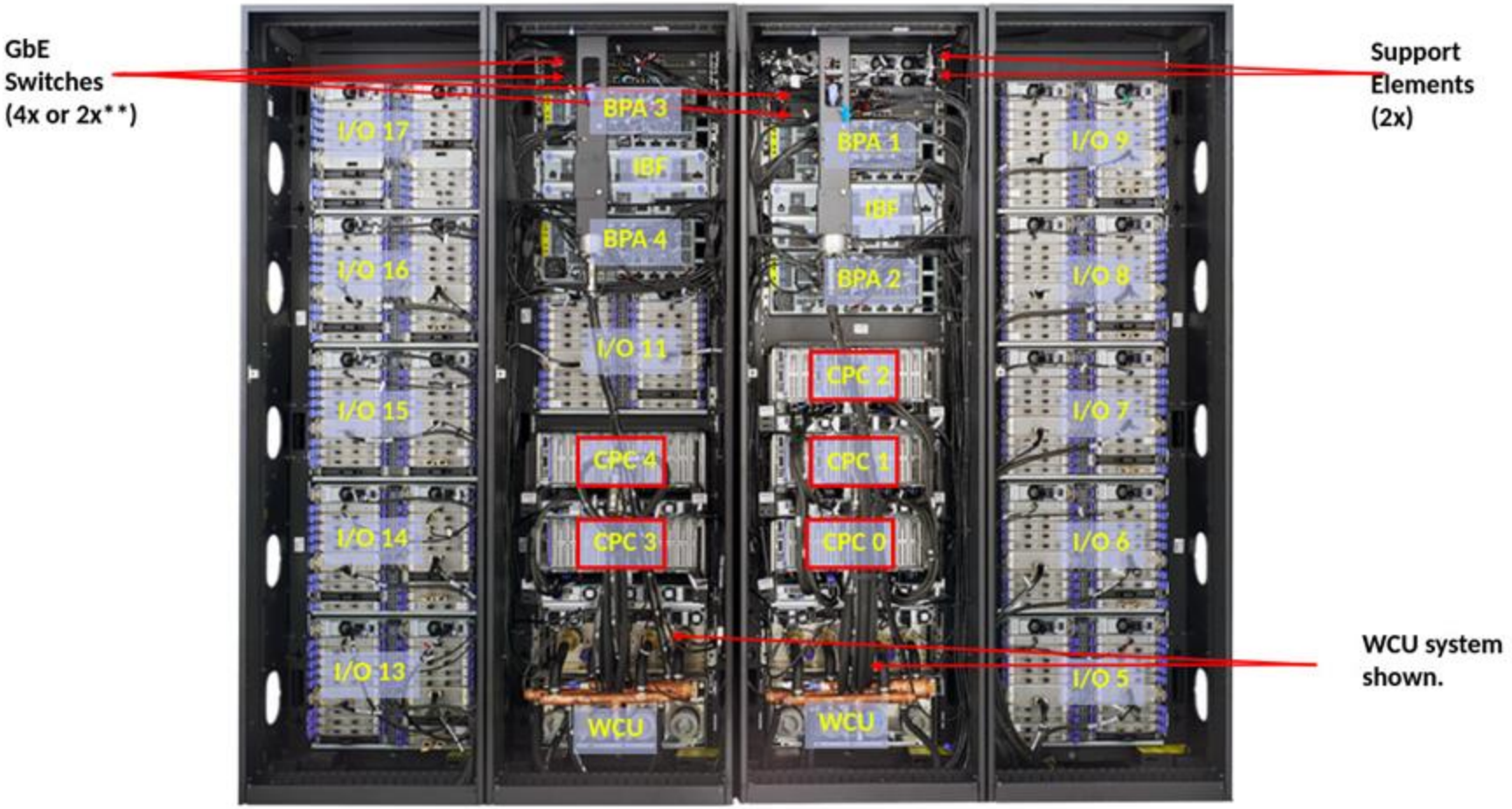
I did on-prem things, then cloud things, now I do mainframe things… which are also on-prem and cloud things!



- Author: Official Ubuntu Book & Common OpenStack Deployments
- Linux Systems Administrator
- Developer Advocate for IBM Z

What is a mainframe?

What is a mainframe?

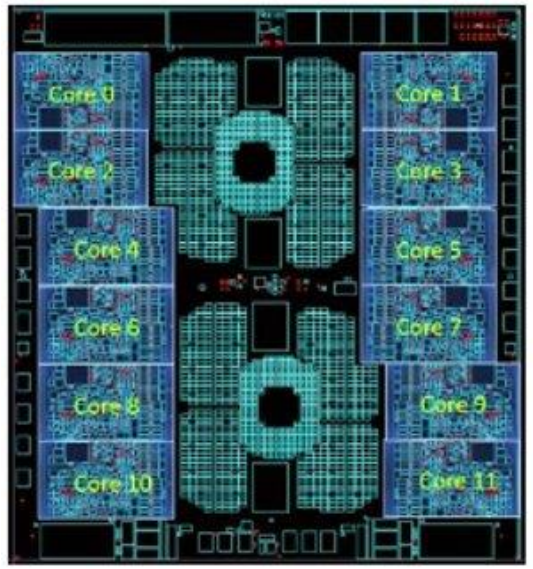


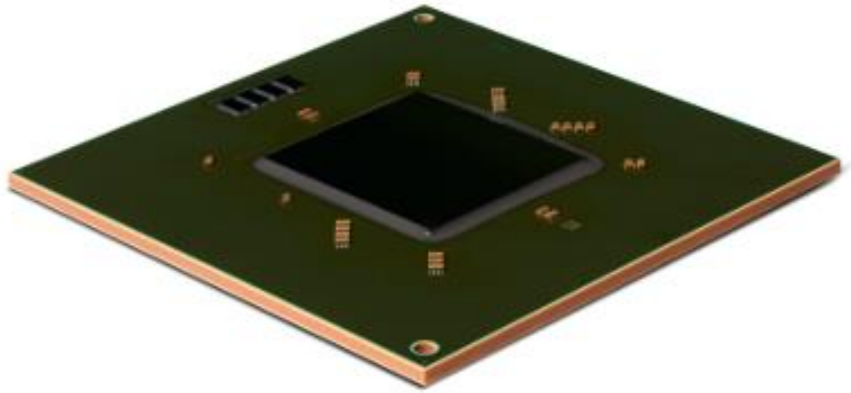
IBM Z / s390x / zArchitecture

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





Open source since when?

Lots of free and open
source software stories start with Unix.

This one doesn't.

SHARE-ing since 1955!

- In 1955, the volunteer-run SHARE Inc[1] was founded by users of the IBM 701.
- 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"[1] and 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."

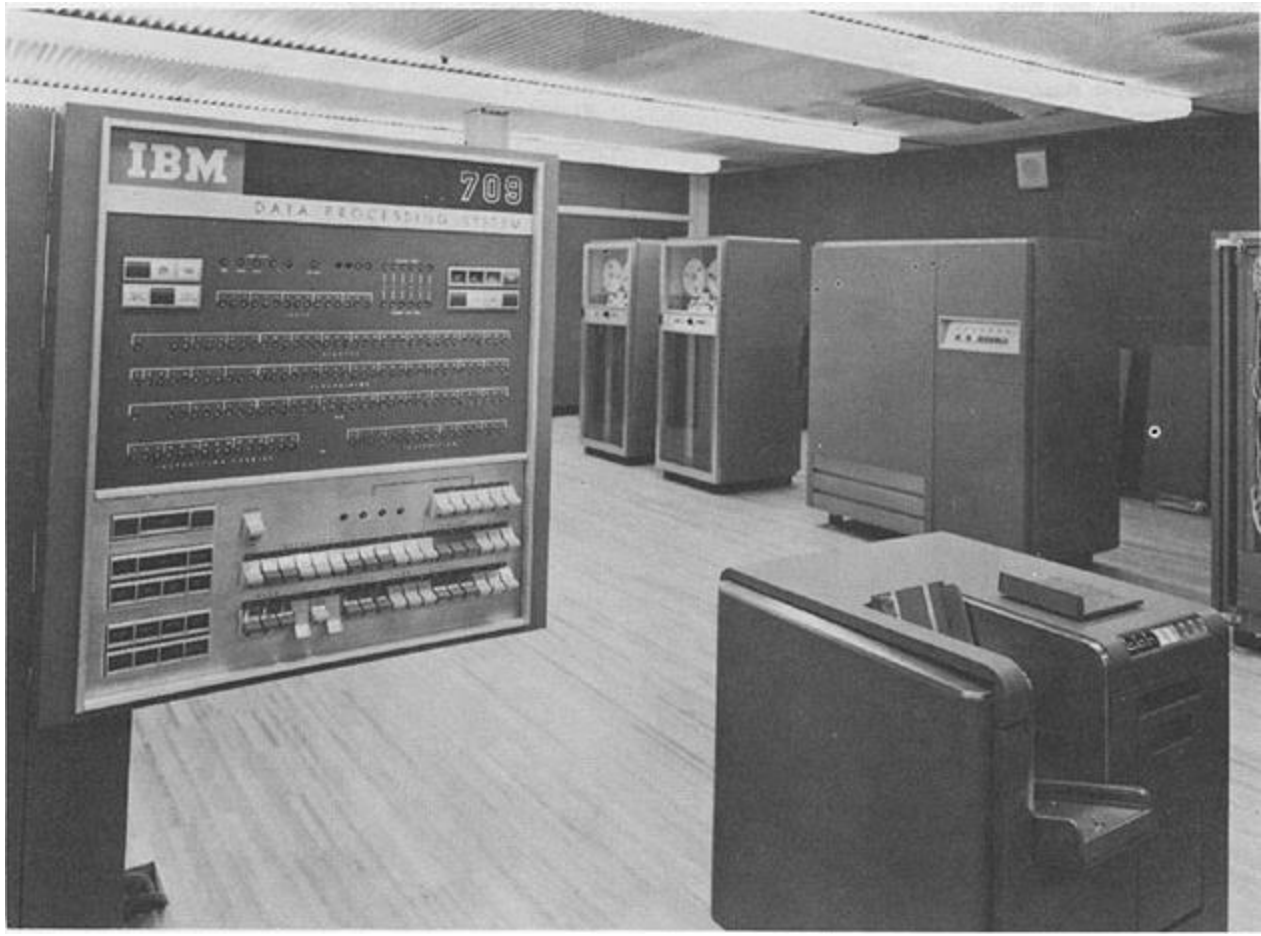
[1] https://www.share.org/

[2] https://en.wikipedia.org/wiki/SHARE_(computing)

SHARE
EDUCATE • NETWORK • INFLUENCE

Computers didn't always have 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.



What do you think about virtualization, 1972?

The first releases of VM[1] came as VM/370 in 1972.

They were the product of a collaboration between organizations, including companies, universities, and government entities has continued through the decades in the VM community.

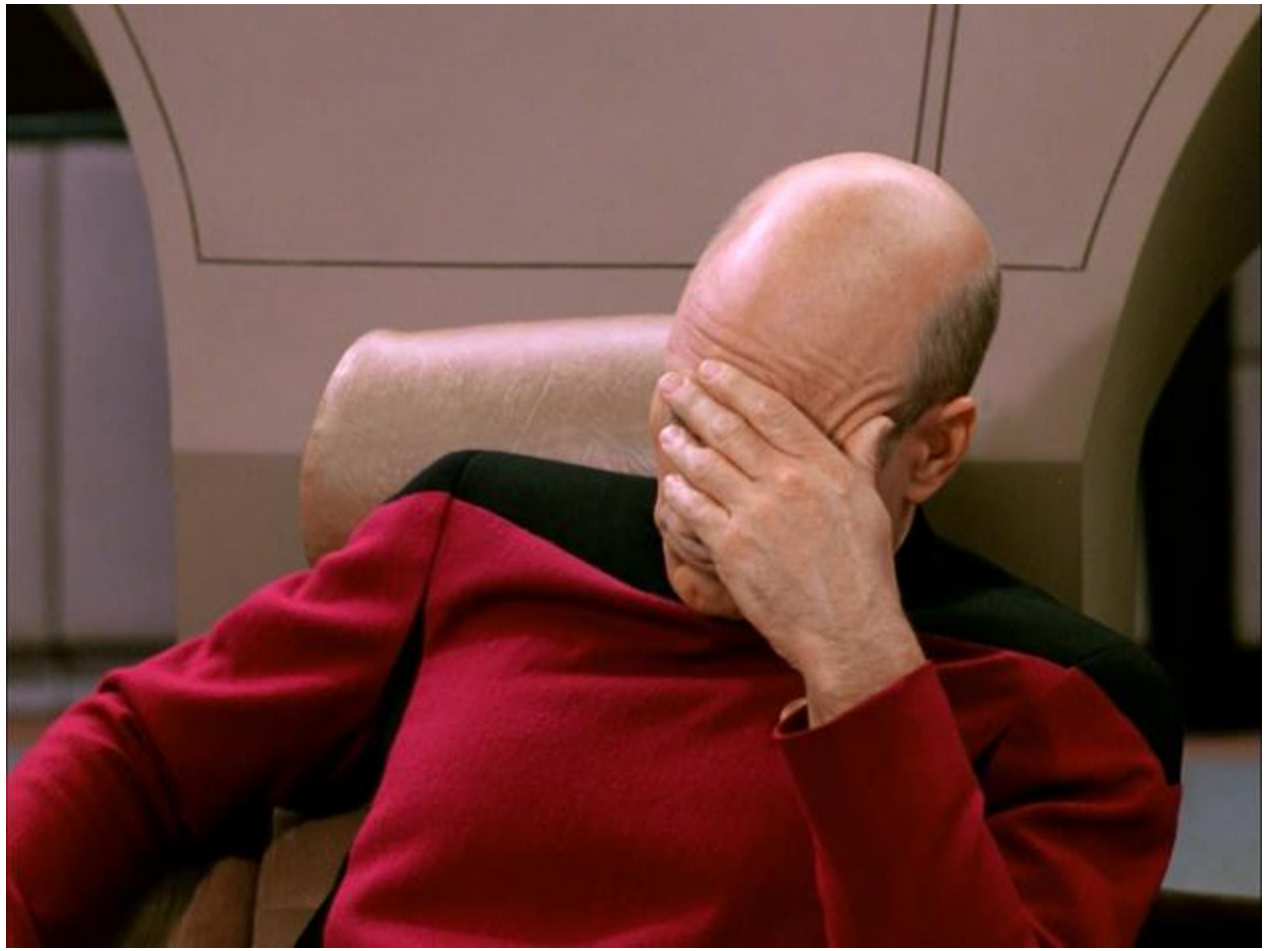
In Melinda Varian's VM and the "VM Community: Past, Present, and Future"[2] paper, she highlights key moments in VM history and the parties involved.

(Fun fact: IBM wasn't so convinced)

[1] https://en.wikipedia.org/wiki/VM_(operating_system)
[2] http://www.leeandmelindavarian.com/Melinda/

IBM: **“I don’t think anyone needs VMs”**(paraphrased)

The Doubtful Decade.



But it got better!

The Doubtful Decade ended and VM community thrived, along with the technology and support from IBM.

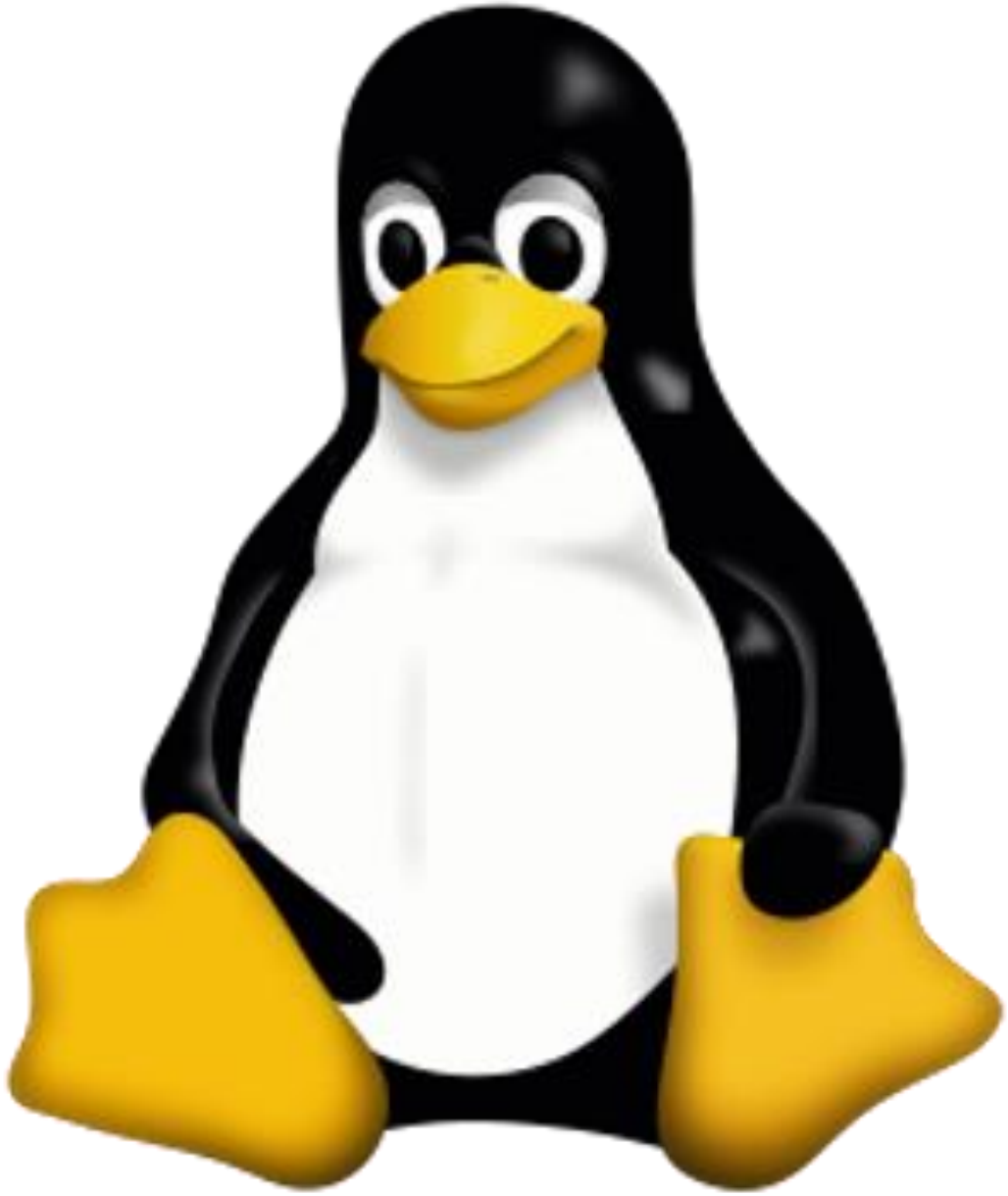
In 1994 experimental TCP/IP support was added to VM, adding a key component to supporting Linux 5 years later.

Linux Origins: Bigfoot

Development by Linas Vepstas in 1998-1999 as a community effort.

“the **Bigfoot (i370)** port was started first”

Source: Linas 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

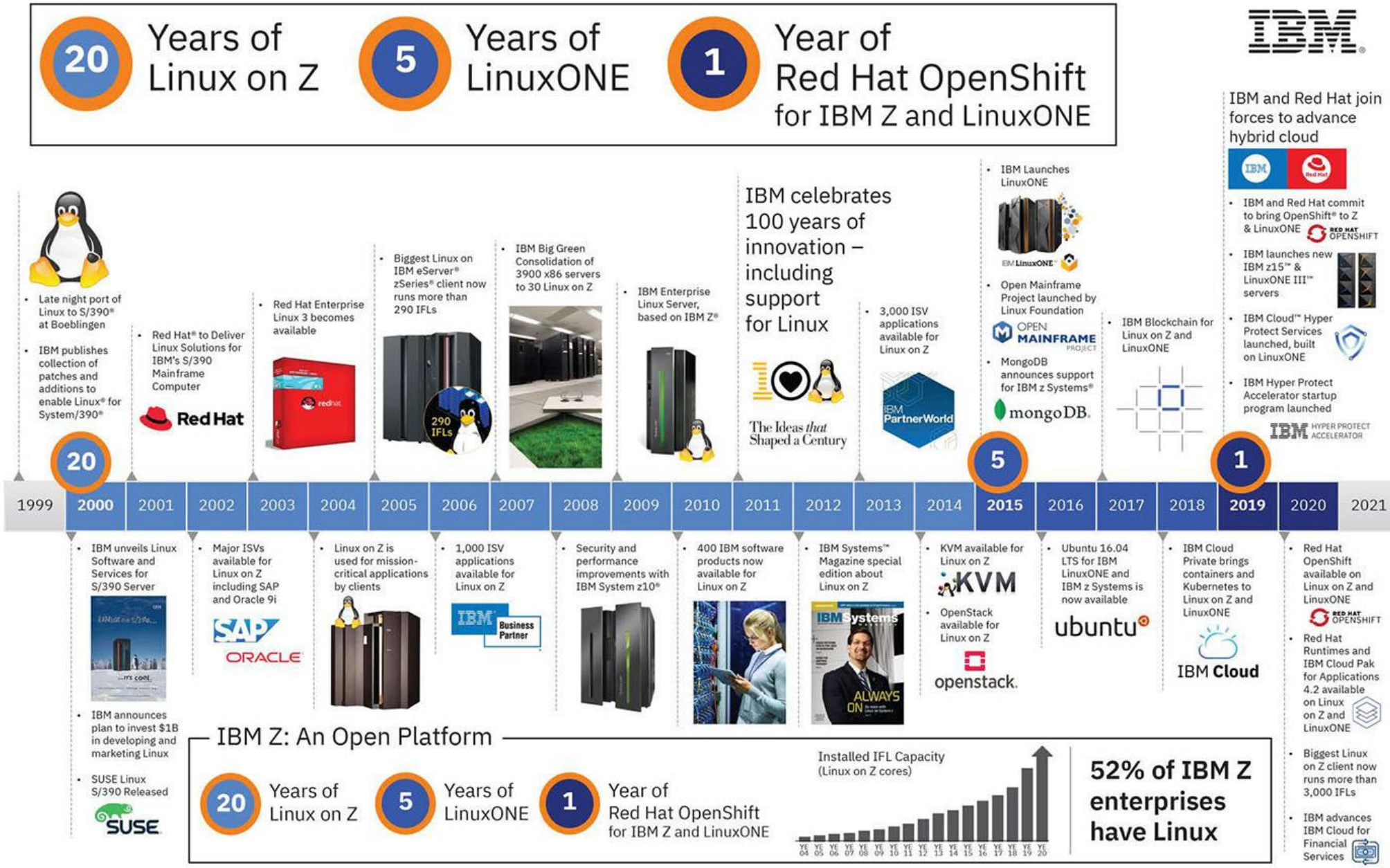
The big kids want in!

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

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

Red Hat 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.



https://newsroom.ibm.com/20-Years-of-Linux-on-Z

Linux in 2015

At the Linux Foundation's LinuxCon 2015, IBM announced the first Linux-only mainframe, the IBM LinuxONE on the keynote stage.

Today's LinuxONE is in its third iteration, with the LinuxONE III released in September 2019.

(Don't worry, I'm not here to sell you one, but I can get you free access… stay tuned!)

2015: LinuxONE Emperor & Rockhopper

2017: LinuxONE Emperor II & Rockhopper II

2019: LinuxONE III

Growing IBM Z & LinuxONE Open Source Ecosystem

Linux Distributions & Virtualization

Red Hat, SUSE, ubuntu, KVM

Community Versions

debian, openSUSE, fedora, ClefOS, alpine linux

Networking & Monitoring

NGINX, HAPROXY, Apache MESOS, ZABBIX, Apache ZooKeeper, etcd

Cloud & Container Services

docker, LXD, openstack., kubernetes, minikube, HELM, Istio, okd, OPENSHIFT, APACHE HTTP SERVER PROJECT, MARATHON, docker Compose, Sysdig, Terraform, kata containers, podman

Languages & Runtimes

Java, JS, R, python, Open Liberty, Ruby, Scala, GO, node, pypy, ERLANG, php, RAILS, OCaml, OpenJ9, OpenJDK, Apache Tomcat, Groovy, Clojure, HYPERLEDGER FABRIC, WildFly, TensorFlow

DevOps/Automation

CHEF, ANSIBLE, puppet, Jenkins, JMeter, Travis CI, ANTLR, Maven, sonarqube, Gradle, SALTSTACK

Middleware

Apache ACTIVEMQ, Apache Camel, muleESB, RabbitMQ, mosquitto, APACHE GEODE, HIBERNATE

Big Data, Observability, Analytics

splunk>, Flink, Apache Spark, Apache Solr, apache Ignite, apache kafka, fluentd, Grafana, logstash, elasticsearch, kibana

Databases

CouchDB relax, MariaDB, mongoDB., RethinkDB, redis, PostgreSQL, MySQL, cassandra, SCYLLA, Couchbase

www.ibm.com/community/z/open-source-software/

Open Source Resources for Linux: Finding

- Search in your distro!
- Go directly to the project, do they have s390x builds?
- Verified Software List from IBM https://www.ibm.com/community/z/open-source-software/
- DockerHub (IBM Z search): https://hub.docker.com/search?type=image&architecture=s390x
- Open Mainframe Project Software Discovery Tool (in development!) https://www.openmainframeproject.org/projects/software-discovery-tool

Open Source Resources for Linux: Porting

- LinuxONE Community Cloud: https://developer.ibm.com/linuxone
  - *This is that free access to LinuxONE I was talking about!*
- 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): https://docs.travis-ci.com/user/multi-cpu-architectures/
- Ubuntu Personal Package archives on Launchpad.net https://help.launchpad.net/Packaging/PPA
- OpenSUSE build service https://build.opensuse.org/

Cool, Linux.

What about z/OS?

Open Source Software on z/OS

ANSIBLE	Ansible is an automation tool for configuration and deployment of software	Contributions: https://github.com/ansible/ansible Download: https://www.ansible.com/integrations/infrastructure/ibm-zos
Apache Spark	Apache Spark is an analytics engine for large-scale data processing	Contributions: https://github.com/IBM/Spark-on-zOS Download: https://developer.ibm.com/javasdk/downloads/spark/
CONDA	Package, dependency and environment management	Download: https://anaconda.org/IzODA/repo
cics-bundle-maven	Maven plugin to build CICS bundles	Contributions: https://ibm.github.io/cics-bundle-maven/ Download: ibm.github.io/cics-bundle-maven
cics-bundle-common	Gradle plugins to build CICS bundles	Contributions: https://github.com/IBM/cics-bundle-gradle Download: https://github.com/IBM/cics-bundle-gradle

Open Source Software on z/OS

	Zowe, modern interfaces to interact with z/OS, allows to work with z/OS in a way that is similar to what you experience on cloud platforms today	Contributions: https://github.com/zowe/community/blob/master/README.md Download: https://www.zowe.org/download.html
	Galasa is an integration test framework	Contributions: https://galasa.dev/ Download: https://github.com/galasa-dev
	JavaScript runtime built on Chrome's V8 JavaScript engine	Download: https://github.com/ibmruntimes/node
	Open Enterprise Python is an industry-standard Python interpreter for z/OS	Download: https://developer.ibm.com/mainframe/2020/06/22/python-for-zos-now-available/
	Popular object-oriented programming language	Download: https://developer.ibm.com/javasdk/support/zos/
	Perl is a general-purpose, interpreted, dynamic programming language	Download: https://www.rocketsoftware.com/zos-open-source

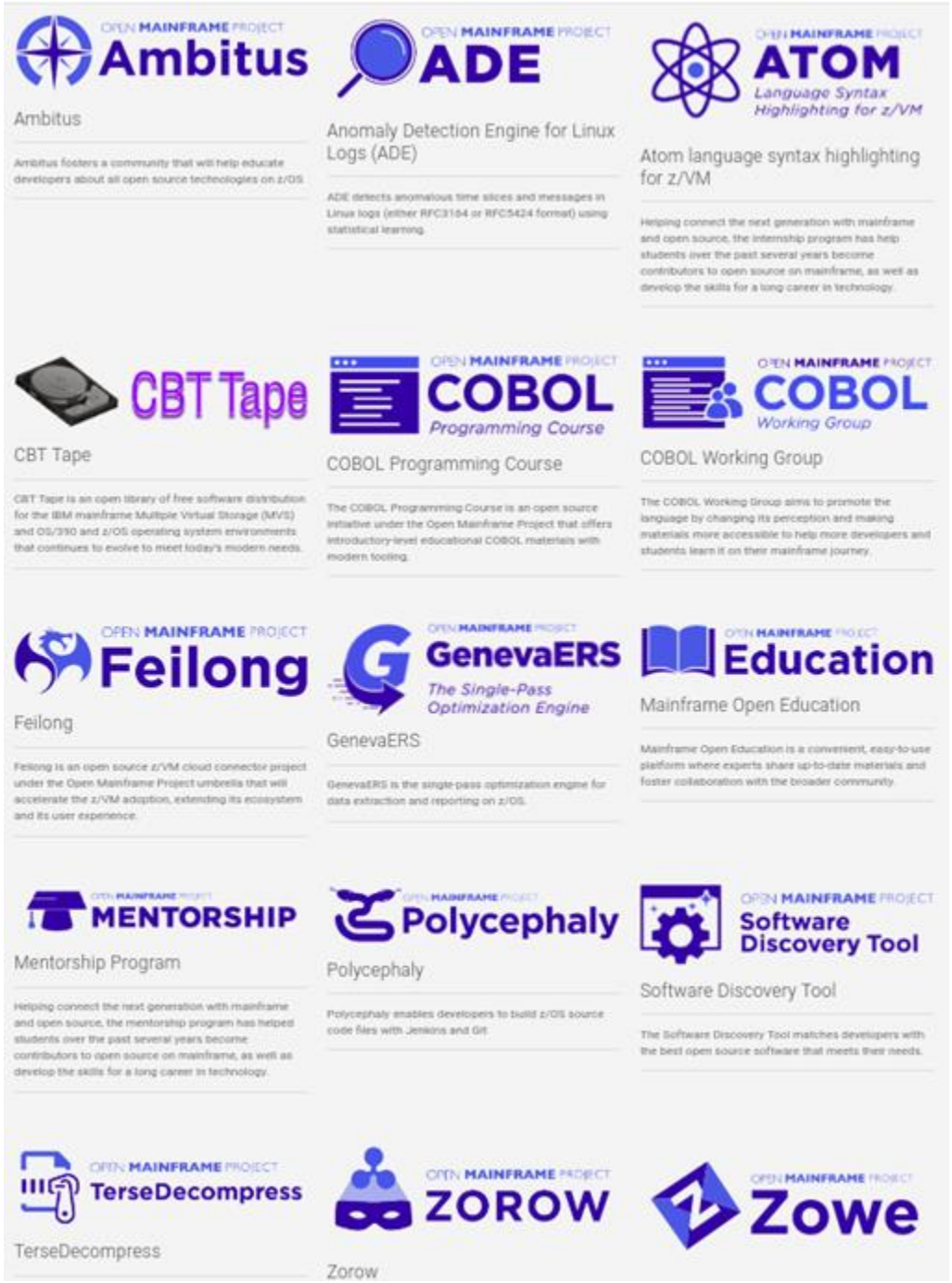
Open Source Software on z/OS

	PHP is a server-side scripting language, offering a simple and universal solution for easy-to-program dynamic Web pages	Download: https://www.rocketsoftware.com/zos-open-source
	R is a functional language for primarily for data analytics	Download: https://www.rocketsoftware.com/product-categories/mainframe/r-for-zos
	Git is a version control system (VCS) for tracking changes in computer files and coordinating work on those files among multiple people	Download: https://www.rocketsoftware.com/zos-open-source/tools
	A lightweight open framework for building fast and efficient cloud-native Java microservices	Contributions: https://github.com/OpenLiberty/open-liberty Download: https://openliberty.io
zECS	Enterprise Caching System (zECS) is a cloud enabled distributed key/value pair caching service	Download: https://github.com/walmartlabs/zECS
	Bash is an sh-compatible shell providing users a command-line interpreter	Download: https://www.rocketsoftware.com/zos-open-source/tools

OPEN MAINFRAME PROJECT

OpenMainframeProject.org

- Project Hosting
- Project support (VMs, CI)
- Events (Summits! Mini-summits!)
- Communication (Chat, mailing lists, forums)
- Mentorship program



Working with open source in the enterprise

Some parting thoughts for open source types

Questions?

Elizabeth K. Joseph | @pleia2

lyz@princessleia.com | lyz@ibm.com

Thank you!

Photo Copyright@IBM via Andreas Weßling. More pretty glass model pictures at: http://ibm.biz/IBMCCBOE_z15T02_pictures