Modernizing Workloads with Linux on Your Mainframe

Elizabeth K. Joseph, IBM

@pleia2
What is a mainframe?

IBM System 360 (s/360), 1964

IBM z15, 2019
What is a mainframe?

A big computer. (but not as big as they used to be)

40TB of RAM, and 60 PCIe control units across 12 PCIe I/O drawers.

22 dedicated I/O offload processors (SAPs) pre-allocated and up to 85 Logical partitions (LPARs).
What is a mainframe?

Not x86.

(IBM Z | zArchitecture | s390x)

190 5.2 ghz processor units, with 12 cores per chip.
What is a mainframe?
What is a mainframe?

Plus storage.

(measured in Petabytes!)
What does a mainframe run?

z/OS
z/OS, a widely used mainframe operating system, is designed to offer a stable, secure, and continuously available environment for applications running on the mainframe.

z/TPF
The z/Transaction Processing Facility (z/TPF) operating system is a special-purpose system that is used by companies with very high transaction volume, such as credit card companies and airline reservation systems.

z/VM
As a control program, z/Virtual Machine (z/VM) is a hypervisor because it runs other operating systems in the virtual machines it creates.

z/VSE
z/Virtual Storage Extended (z/VSE) is popular with users of smaller mainframe computers. Some of these customers eventually migrate to z/OS when they grow beyond the capabilities of z/VSE.

z/OS, a widely used mainframe operating system, is designed to offer a stable, secure, and continuously available environment for applications running on the mainframe.

Linux
Several (non-IBM) Linux distributions can be used on a mainframe.

Source:
Yes, they run Linux!

- ...and they have for 20+ years.
- Community efforts to port Linux to the mainframe were made public in 1998.
- IBM released the first set of kernel patches in December 1999.
- In October of 2000, SUSE Enterprise Linux was released for the mainframe (the x86 version didn't come until April 2001!)
- Official support today for SLES, RHEL, and Ubuntu
Elizabeth K. Joseph, IBM

Linux Systems Administrator
Open Source Contributor
Developer Advocate
Author

And has no idea how to sell you a mainframe
Why keep the mainframe?

- No-fuss, enterprise-grade storage, and fast access to that storage.
- Fastest commercially-available processors.
- Unmatched hardware reliability and 99.999% uptime.
- Fast, pre-configured communication between VMs.
- Hardware-driven cryptography.
- Security through the highest rated HSM (Hardware Security Module).
And with Linux...

The latest, industry-standard tooling!
So, you have everything?

Well, no.

Some projects do porting.

The distributions handle some of the porting.

Porting teams at IBM work continuously to port software and work with communities to keep it current.
Unleash the power to innovate with IBM 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
The Kubernetes project releases s390x packages

- Canonical: [https://ubuntu-on-big-iron.blogspot.com/2019/08/deploy-cdk-on-ubuntu-s390x.html](https://ubuntu-on-big-iron.blogspot.com/2019/08/deploy-cdk-on-ubuntu-s390x.html)
Automation

• Ansible
• Chef
• Juju
• Puppet
• SaltStack
CI/CD Pipelines

- Docker
- Jenkins
- Travis CI (currently offering s390x builds for open source projects)
"Security and Linux on z Systems"
http://www.redbooks.ibm.com/abstracts/redp5464.html
Languages

- Python
- Golang
- Ruby
- PHP
- R
- Node.js, Swift, Java (z/OS too!)
- ...

Languages
Virtualization

- z/VM can be driven by new open source tooling
- KVM is supported, allowing you to use libvirt and a large ecosystem of other open source tools built for KVM
"Feilong is a z/VM Cloud Connector that provides virtual resource management for z/VM. Users can manage the VM lifecycle dynamically and automatically without deep knowledge of z/VM itself through REST API. Users do not need to manually provision, manage, and destroy guests. Feilong also provides an SDK to make it easy to develop system management tools. Fundamentally, Feilong allows IaaS/PaaS solutions such as OpenStack™ or Terraform to consume z/VM by providing REST APIs, making time to market faster."

https://www.openmainframeproject.org/projects/feilong
Distributions
- Red Hat
- SUSE
- ubuntu
- fedora
- openSUSE
- CentOS

Hypervisors
- LPA
- KVM

Community Versions
- debian
- openSUSE
- fedora

PaaS / IaaS
- docker
- kubernetes
- LXD

Languages
- python
- node
- php
- R
- scala
- Clojure
- OCaml
- JS
- java
- Swift
- LuaJIT

Runtimes
- Chef
- Puppet
- Ansible
- Zend Framework
- SALTSTACK
- OpenJDK
- etcd
- Terraform
- Apache Tomcat
- Apache Zookeeper
- DPM

Management
- IBM Cloud
- vRealize
- RethinkDB
- Redis
- Couchbase
- Apache Spark
- ORACLE
- IBM
-弹性搜索

Database
- MySQL
- MongoDB
- cassandra
- elasticsearch
- Solr
- Tensorflow

Analytics
- Apache
- MySQL
- PostgreSQL
- MongoDB
- elasticsearch
- Solr
- Tensorflow
Bring your mainframe team and Linux team together

Cross-train on certain roles
Questions?

• Elizabeth K. Joseph
• lyz@ibm.com
• @pleia2
Open FinTech Forum

AI, Blockchain & Kubernetes on Wall Street