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Tips and tools for porting your open source application to IBM LinuxONE

Elizabeth K. Joseph | *Developer Advocate* | IBM



IBM Z



OPEN Z



GLOBAL Z



VOICES OF Z



MASTER THE
MAINFRAME

Hello, there!

- Spent 15 years as a Linux Systems Administrator, mostly on distributed systems.
- Author of books on Ubuntu and OpenStack.
- Now I get to work with open source software developers on Linux on IBM Z and LinuxONE.

IBM Z / zArchitecture / s390x

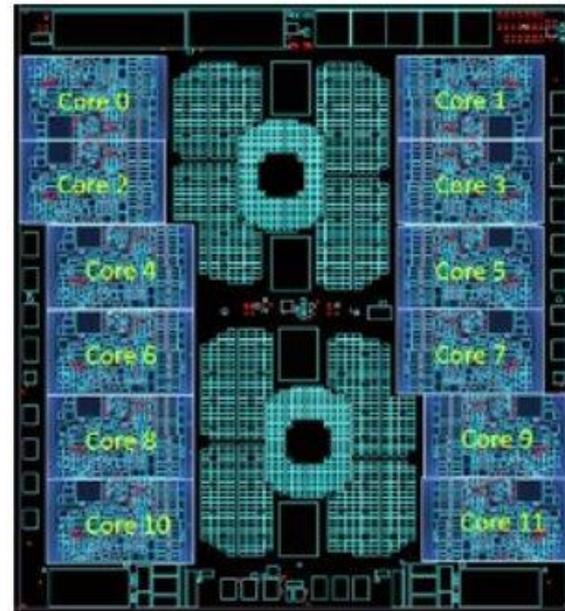
First, let's talk about hardware

IBM Z is not x86, the processors are exclusive to IBM Z and LinuxONE.

Code needs to be compiled or interpreted for the platform.

You're in luck, there are loads of open source compilers and interpreters for Linux on IBM Z. C, Go, Python, Node.js...

Pro tip: In the Linux world, you'll often see the architecture referred to as "s390x"



Why should I port my app to Linux on IBMZ and LinuxONE?

Adoption of Linux on IBM Z is rapidly growing, with it you can start reaching a broader, more serious, enterprise audience.

Non-x86 architectures are becoming increasingly popular, get a head start.

By learning more about architectures like s390x, ppc64le, and ARM, you become a better developer.



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Following in the steps of giants

Many open source projects have come before you <http://community.ibm.com/z/open-source>

Linux Distributions & Virtualization	Cloud & Container Services	Languages & Runtimes	DevOps/Automation	Big Data, Observability, Analytics
 Red Hat  ubuntu  SUSE  KVM	 docker  LXD  openstack	 Java  JS  R  python  Open Liberty	 CHEF  ANSIBLE  puppet  Jenkins  Travis CI  Maven  Gradle  SALTSTACK	 splunk  Flink  Spark  Solr  kafka  fluentd  logstash  elasticsearch  kibana
Community Versions	 kubernetes  minikube  HELM  Istio  okd  OPENSIFT	 Ruby  Scala  GO  node  PYPY  ERLANG  php	 Jenkins  ANTLR  sonarqube  Maven  Gradle  SALTSTACK	 Grafana  elasticsearch  kibana
Networking & Monitoring	 APACHE HTTP SERVER PROJECT  docker  Compose  MARATHON  Sysdig  Terraform  kata containers  podman	 RAILS  OCaml  OpenJ9  OpenJDK  Apache Tomcat  Clojure  TensorFlow	 Middleware  ACTIVE MQ  Camel  muleESB  RabbitMQ  APACHE GEODE  HIBERNATE	 CouchDB  mongoDB  RethinkDB  PostgreSQL  cassandra  Couchbase

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Let's take a closer look at part of that diagram...

Linux Distributions & Virtualization



A Linux distribution is made up of a bunch of software, so does that mean that everything that's part of Red Hat, SUSE, and Ubuntu has been compiled for IBM Z?

Not quite.

But it is the core operating system, and a large chunk beyond that!

There's a lot of software that just compiled fine without any changes – neat!

Now, languages!

Your code probably will compile fine! Try it! But if not, consider...

Lower-level languages are, by definition, closer to the hardware.

These are more apt to take advantage of architecture-specific instructions, and thus be tied to an architecture.

Struggling to build for Z? This is an opportunity to learn why, and see whether the benefit is worth it, and how your code may be changed to support a broader range of hardware.

Higher-level languages usually "just work" out of the box.

The most common stumbling block is dependencies that aren't ported! This could be in the form of a module for your language or other software projects that yours depends on.

Cool, how do I get one?

Well, they're kind of big*

- Several community-driven Linux distributions actually do have access to one! For instance, the Debian community has a build for x390x.
- Two of the commercial distributions make their systems available to community contributors.
- There are also a couple free CI systems.
- And you can get your hands on a full Linux on Z VM!

So let's dig in, shall we?

* But not as big as they used to be! The IBM z15 and LinuxONE III fit in the space of a standard 19" rack, and increments thereof up, to 4 wide



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openSUSE Build Service

The openSUSE Build Service automatically builds your application for multiple architectures and distributions.

You do have to be familiar with software packaging of at least RPMs, but then the build service takes it from there.

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

https://en.opensuse.org/Portal:Build_Service

The screenshot displays the openSUSE Build Service web interface for the 'snappy' package. The page is titled 'openSUSE Build Service > Projects > home:markkp:branches:openSUSE:Factory:zSystems > snappy'. It features a navigation menu with 'Downloads', 'Support', 'Community', and 'Development'. The main content area includes an 'Overview' tab, a description of the 'snappy' library, and a 'Source Files' table. The 'Source Files' table lists files such as '1.1.7.tar.gz', 'baseelbs.conf', 'snappy-pcfile.patch', 'snappy.changes', and 'snappy.spec'. Below the table, there is a 'Latest Revision' section with a 'Mark Post' button. On the right side, the 'Build Results' section shows a list of build results for various architectures and distributions, including 'SLE_12_SP2', 'SLE_12_SP3', 'SLE_12_SP4', 'SLE_15', 'openSUSE_Factory', 'openSUSE_Factory_ARM', 'openSUSE_Factory_PowerPC', 'openSUSE_Factory_zSyst', 'openSUSE_Leap_15.0', 'openSUSE_Leap_15.1', and 'openSUSE_Leap_42.3'. The results indicate that most builds were successful, with one failure for 'SLE_12_SP2' on the 'x86_64' architecture.

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

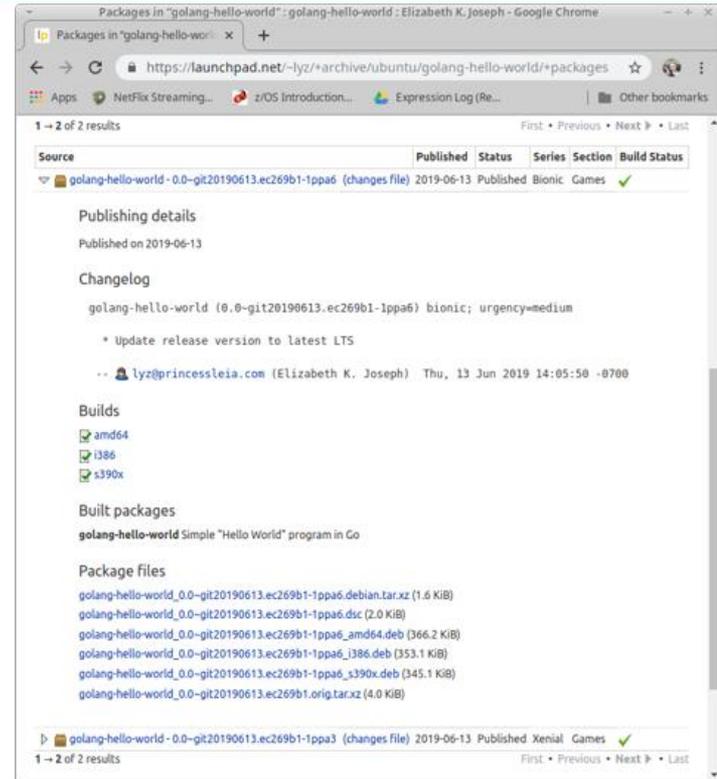
Build Results	Architecture	Status
snappy	x86_64	failed
SLE_12_SP2	aarch64	successful
SLE_12_SP3	ppc64le	successful
	s390x	successful
	x86_64	successful
SLE_12_SP4	aarch64	successful
	ppc64le	successful
	s390x	successful
SLE_15	x86_64	successful
openSUSE_Factory	i586	successful
	x86_64	successful
openSUSE_Factory_ARM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

Launchpad Personal Package Archives for Ubuntu

Launchpad.net, hosted by Canonical, maintains a Personal Package Archive (PPA) service that allows you to build for multiple architectures by selecting them.

Familiarity with .deb packaging is required, but at the end you get .deb packages, and an Ubuntu repository URL for users.

<https://help.launchpad.net/Packaging/PPA>



The screenshot shows a web browser window displaying the Launchpad page for a Personal Package Archive (PPA) named 'golang-hello-world'. The URL is <https://launchpad.net/~lyz/+archive/ubuntu/golang-hello-world/+packages>. The page shows the source 'golang-hello-world - 0.0-git20190613.ec269b1-1ppa6' published on 2019-06-13. It includes publishing details, a changelog with an update to the latest LTS, and a list of built packages and package files for various architectures (amd64, i386, s390x).

Source	Published	Status	Series	Section	Build Status
golang-hello-world - 0.0-git20190613.ec269b1-1ppa6 (changes file)	2019-06-13	Published	Bionic	Games	✓

golang-hello-world Simple "Hello World" program in Go

Package files

- golang-hello-world_0.0-git20190613.ec269b1-1ppa6.debian.tar.xz (1.6 KiB)
- golang-hello-world_0.0-git20190613.ec269b1-1ppa6.dsc (2.0 KiB)
- golang-hello-world_0.0-git20190613.ec269b1-1ppa6_amd64.deb (366.2 KiB)
- golang-hello-world_0.0-git20190613.ec269b1-1ppa6_i386.deb (353.1 KiB)
- golang-hello-world_0.0-git20190613.ec269b1-1ppa6_s390x.deb (345.1 KiB)
- golang-hello-world_0.0-git20190613.ec269b1.orig.tar.xz (4.0 KiB)

Open Mainframe Project: Supported Projects Program

"Open Mainframe Project provides the needed infrastructure and program support for many open source projects that support mainframe. This tailored support program gives each project the ability to leverage the project's mainframe infrastructure, ecosystem development, funded development channels, and legal management.

- Hosted mainframe infrastructure for build/test/development for the project
- Promotion of the project supporting mainframe via Open Mainframe Project promotion channels (blog, social, events) to engage contribution from the mainframe community.
- Access to propose internship and academic projects through the Open Mainframe Project
- Leveraging any Open Mainframe Project collaborative infrastructure for supporting mainframe community engagement (inclusive of code repositories, forums, chat, and any other developer collaboration tools used)"



<https://www.openmainframeproject.org/projects/supported-projects>

OSU Open Source Lab IBM Z Continuous Integration

Already using Jenkins for your project CI? The Oregon State University Open Source Lab (OSU OSL) manages a Jenkins service!

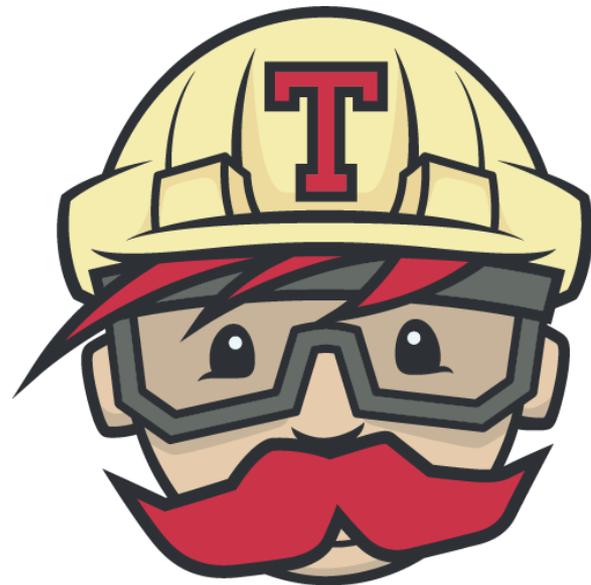
<https://osuosl.org/services/ibm-z/>



Travis CI build service for IBM Z

Travis CI user? It just takes a couple changes to your build config to try out the IBM Z beta program for open source projects.

<https://docs.travis-ci.com/user/multi-cpu-architectures/>



IBM LinuxONE Community Cloud

120 days access to a SLES or RHEL Virtual Machine.

Come talk to me if you want one for longer ;) a CI system perhaps?

Learn more and sign up: <https://developer.ibm.com/components/ibm-linuxone/gettingstarted/>

And then join our community: <https://www.ibm.com/community/z/linuxone-cc/>

Questions?

Or reach out afterwards! Email lyz@ibm.com or @pleia2 on Twitter

Find other like-minded open source contributors at the Open Mainframe Project <https://www.openmainframeproject.org/>

And join us over in the IBM Z Community: Open Source Software Development user group! <https://www.ibm.com/community/z/usergroups/opensource>

I also wrote about this topic on IBM Developer <https://developer.ibm.com/components/ibm-linuxone/blogs/developer-resources-for-building-your-open-source-app-for-linux-on-ibm-z-and-linuxone/>



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THANK YOU!

Join the IBM Z & LinuxONE Community: ibm.com/community/z/