Mainframe a la mode:

Developer resources for porting your Linux app to IBM Z and LinuxONE

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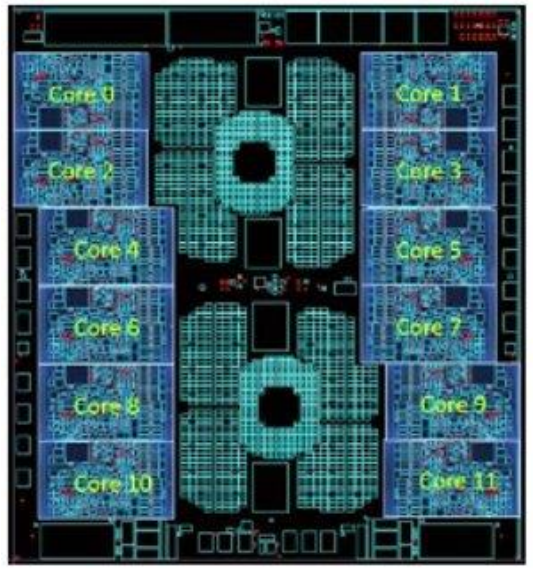
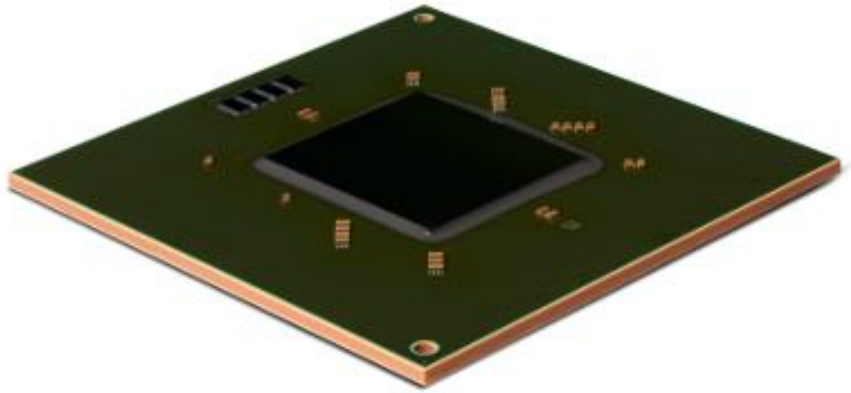
IBM Z / s390x / zArchitecture

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





Linux on IBM Z

- Started out as the "Bigfoot" (i370) port by several community members in 1998-99.
- 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.

Linux Today

Announced at the Linux Foundation's LinuxCon 2015, IBM released the first Linux-only mainframe, the IBM LinuxONE.

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

2015: LinuxONE Emperor & Rockhopper

2017: LinuxONE Emperor II & Rockhopper II

2019: LinuxONE III

IBM Z has an open source legacy!

- In 1955, the volunteer-run SHARE Inc was founded.
- 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://en.wikipedia.org/wiki/SHARE_(computing)

Are other projects porting their apps?

Yep!

Growing IBM Z & LinuxONE Open Source Ecosystem

Linux Distributions & Virtualization

Red Hat, SUSE, ubuntu, KVM

Community Versions

debian, openSUSE, fedora, ClefOS, alpine

Networking & Monitoring

NGINX, HAPROXY, Apache MESOS, Prometheus, ZABBIX, 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

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

Big Data, Observability, Analytics

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

Databases

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

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

IBM Z & LinuxONE Official Docker Images

Open Source Software available in Docker Hub as Official Docker Images

hub.docker.com

Linux Distributions

alpine linux
ubuntu
ClefOS
debian
fedora

Networking & Monitoring

Nextcloud
REDMINE
HAPROXY
APACHE ZooKeeper
jetty://
BASH

Cloud , Web, Languages & Runtimes

docker
pypy
python
GCC
Ruby
JRuby
Open Liberty
GO
Perl
node
php
APACHE HTTP SERVER PROJECT
OpenJDK
ownCloud
BusyBox
Groovy
elixir
Apache Tomcat
WordPress
ghost
Joomla!
Drupal
ERLANG

DevOps/Automation

Maven
Gradle
BUILDPACK
COMPOSER

Big Data, Observability, Analytics

Matomo
Apache Solr
fluentd
PIWIK
phpMyAdmin

Middleware

RabbitMQ
mosquitto
express gateway
Flink

Databases

mongoDB.
redis
PostgreSQL
Adminer
Memcached
STORM

Finding Open Source Software for Linux

- Go directly to the project, do they have s390x builds?
- Ask your vendor, is there a port they maintain?
- Open Mainframe Project Landscape: https://landscape.openmainframeproject.org/
- 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

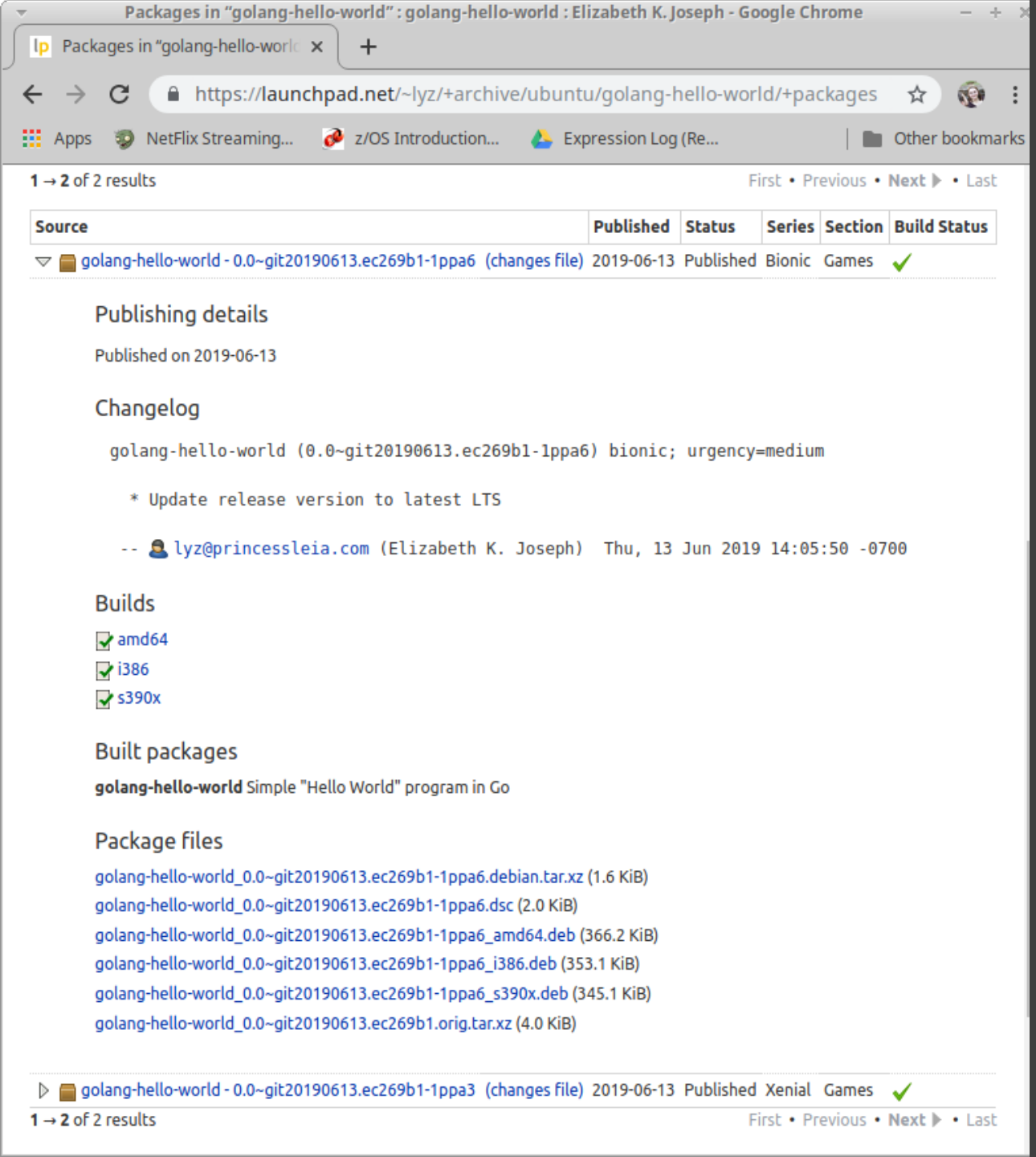
- Full project hosting, including code, and mailing lists
- Blogs and podcasts of general interest to the open source mainframe community
- Slack and forums for communication among participants
- Project support for 3rd party open source projects seeking infrastructure (VMs, CI/CD services)
- New in 2020: Annual conference!

IBM LinuxONE Community Cloud

"The IBM LinuxONE Community Cloud is a no-charge, 24 x 7, enterprise-grade, open access, shared public cloud environment on IBM's LinuxONE platform. Developers, students, professors, entrepreneurs, or anyone from all over the world can sign up for 120-day access to a virtual server with full access to develop, test, or run open source applications on LinuxONE, or to access any of the other services offered."

Visit https://developer.ibm.com/linuxone to get started

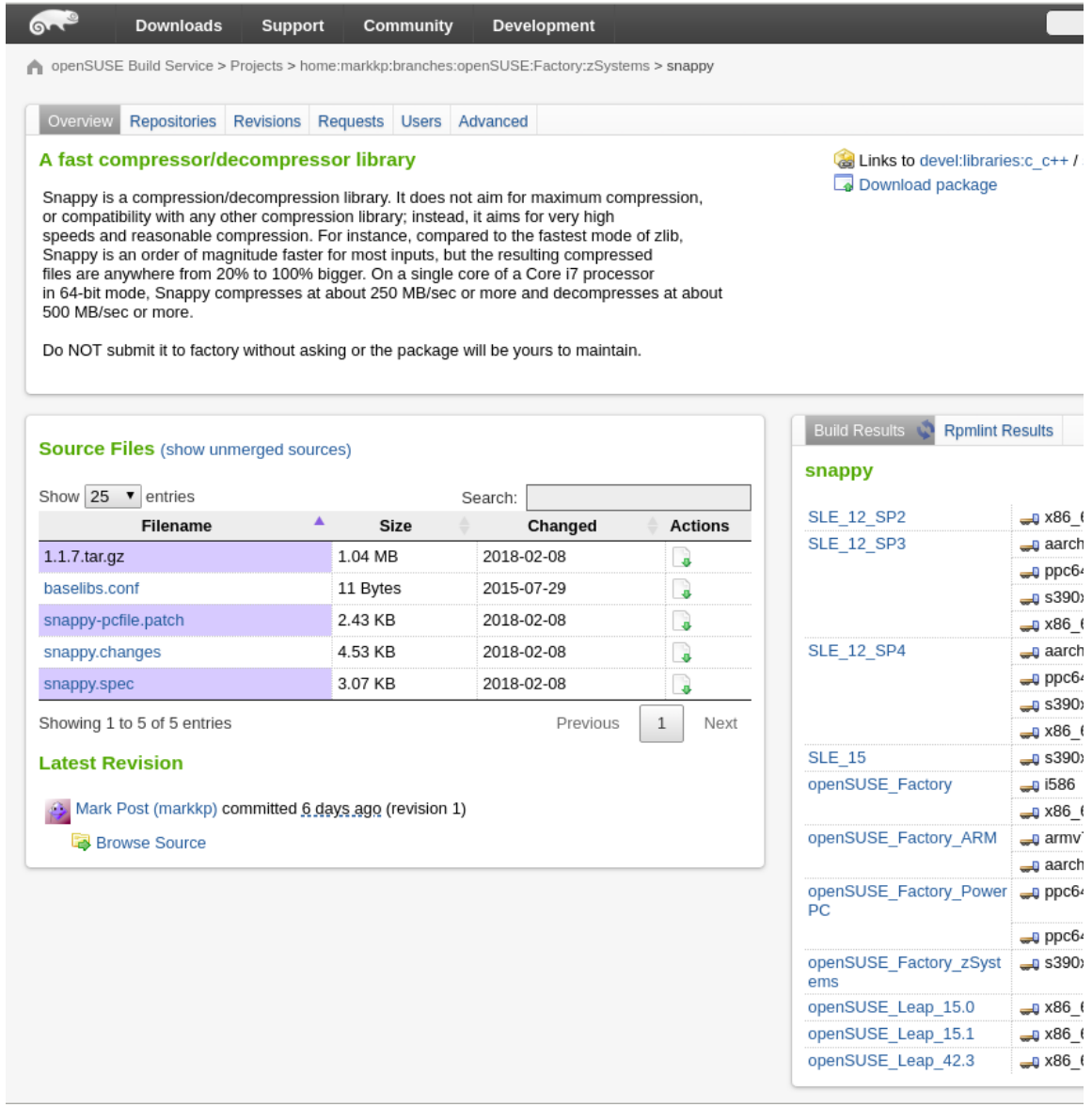
And join the LinuxONE Community Cloud Community at https://www.ibm.com/community/z/linuxone-cc/



Ubuntu Personal Package Archives (PPAs) on Launchpad.net

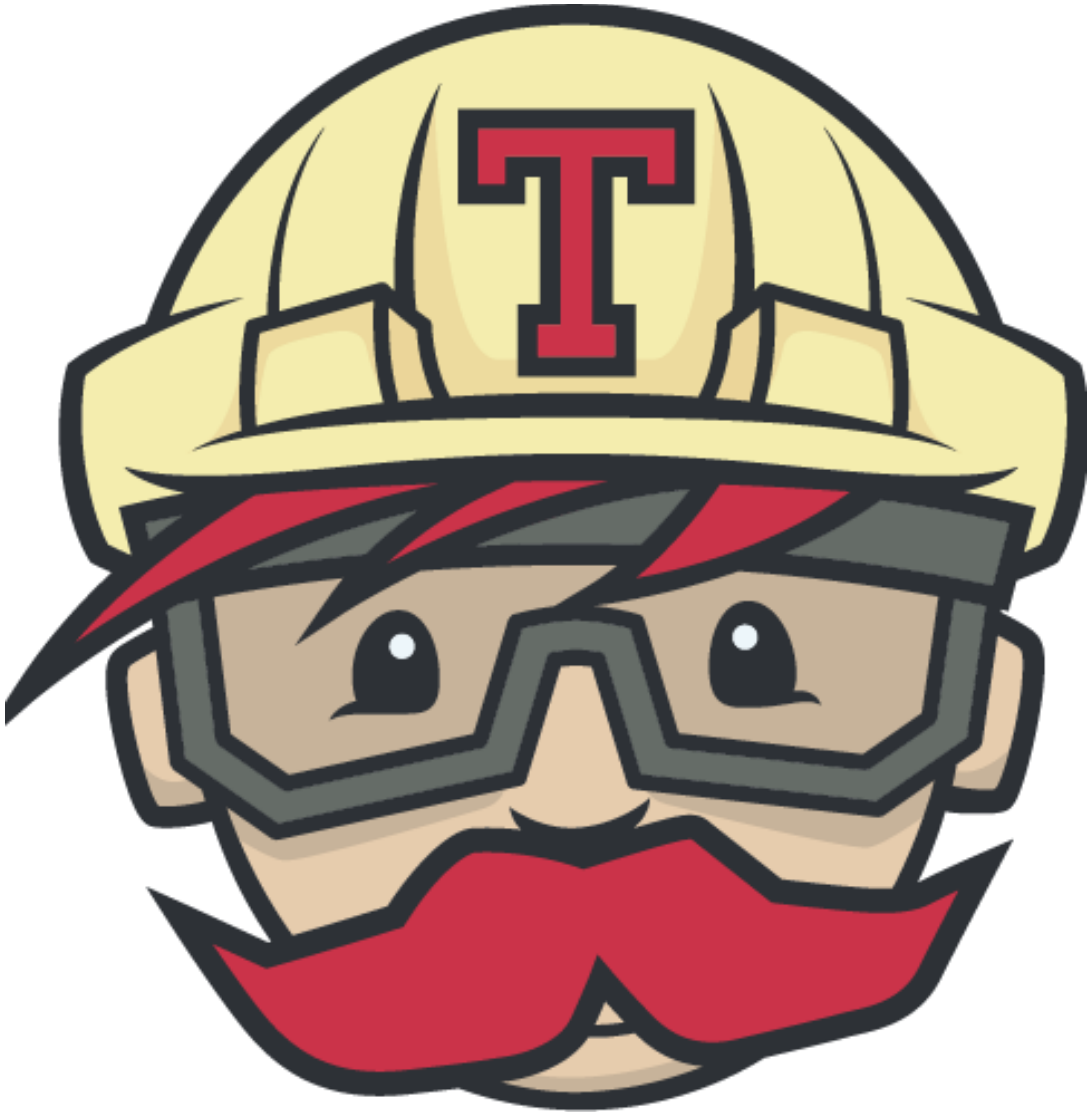
Documentation: https://help.launchpad.net/Packaging/PPA

openSUSE build service
at build.opensuse.org



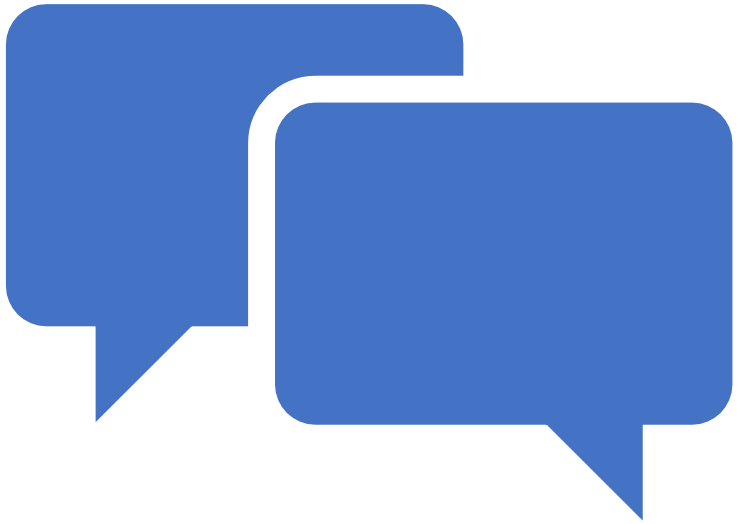
Jenkins instance for s390x maintained by the **Oregon State University Open Source Lab** (OSU OSL)

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



TravisCI build service for s390x (Beta trial for open source projects)

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



So, any programming language?

Programming Language Tips

- Source code across architectures will generally be identical, but it needs to be compiled (C, C++), or otherwise interpreted (Python, Node.js) for this architecture.
- That means you need a compiler or an interpreter built for the mainframe.
- The mainframe architecture is big-endian, but most of the supported architectures today are little-endian.
- Your code will probably build and run, give it a try!
- If not, note that the higher level a language is, the more luck you'll have. Lower level languages like C do more hardware-specific operations, higher level languages like Node.js have much of that abstracted away.