Open Source & ISV Ecosystem Enablement for LinuxONE and IBM z

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Marcel Mitran (mmitran@ca.ibm.com)

November 3, 2015

Chart deck located at: Open Source Ecosystem chart deck URL
Agenda

• LinuxONE and IBM z Overview
• LinuxONE and IBM z Open Source & ISV Ecosystem & Content
• Scalable Financial Trading Analysis and Insights Demo
• Recent Performance Measurements

We are still working through this and learning along the way … and will continue to seek guidance & prioritization from our customers!
World’s leading businesses run on the mainframe

- 92 of the top 100 worldwide banks
- 23 of the top 25 US retailers
- 10 out of 10 of the world’s largest insurers
- 23 out of 25 of the world’s largest airlines

Processing the world’s transactions & data

- 30 billion business transactions processed on the mainframe per day
- 80 percent of the world’s corporate data resides or originates on mainframes
- 91 percent of surveyed CIOs said that new customer-facing applications are accessing the mainframe
- 55 percent of all enterprise applications need the mainframe to complete transactions
New marketplace dynamics will drive hyper growth opportunity for the IBM Mainframe

**Traditional 1964–2014**
- Batch
- General Ledger
- Transaction Systems
- Client Databases
- Accounts payable / receivable
- Inventory, CRM, ERP

**Linux & Java 1999–2014**
- Server Consolidation
- Oracle Consolidation
- Early Private Clouds
- Email
- Java®, Web & eCommerce

**CAMSS² 2015–2020**
- On/Off Premise, Hybrid Cloud
- Big Data & Analytics
- Enterprise Mobile Apps
- Security solutions

- **Open Source LinuxONE and IBM z ecosystem enablement**

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1. MIPS: Millions of Instructions per Second or the metric z uses to measure client workload
2. CAMSS: Cloud, Analytics, Mobile, Social, Security
Linux on IBM z as of 2Q2015

- 15 years of Enterprise Linux® on z Systems™
- 27% of total installed capacity\(^1\) run Linux
- Linux core\(^2\) capacity increased 16% from 2Q14 to 2Q15
- 40% of customers have Linux cores
- 80% of the top 100 customers running Linux on the mainframe\(^3\)
- 67% of new accounts run Linux

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1. Capacity or MIPS: Millions of Instructions per Second or the metric z uses to measure client workload
2. Linux core or IFL: Integrated Facility for Linux or the terminology used to describe a processor core. z13 has on average 7 cores/CPU chip
3. Top 100 is based on total installed MIPS
4. CAMSS: Cloud, Analytics, Mobile, Social, Security

http://www-03.ibm.com/systems/z/os/linux/success/
Introducing the IBM LinuxONE Systems

*THE MOST TRUSTED, EFFICIENT AND HIGH PERFORMANCE ENTERPRISE-GRADE LINUX PLATFORM*

**Linux**

**YOUR WAY**

**Linux WITHOUT LIMITS**

**Linux WITHOUT RISK**
IBM LinuxONE Announcements
A Collection Of Really Cool Stuff!

IBM LinuxONE SYSTEMS
IBM LinuxONE Emperor™
IBM LinuxONE Rockhopper™

IBM LinuxONE SOLUTIONS
Designed For The Digital Economy
Mobile Analytics Cloud DevOps

IBM LinuxONE Elastic Pricing

Wide variety of Open Source & ISV Products Enablement
Distributions Hypervisors Languages Runtimes Management Database Analytics

Open Mainframe Project
IBM LinuxONE Community Cloud
IT Analytics Source Code Contribution

Community Collaborations
Commitment To The Open Community
Time for the next OPEN BREAKTHROUGH

The best of IBM z SYSTEMS

- Dynamic Resource Allocation
- Non-disruptive Scalability
- Continuous Business Availability
- Operational Efficiency
- Trusted Security
- Data and Transaction Serving

The best of LINUX & OPEN

- Freedom & Agility
- Standards based
- Speed to Innovate
- Developer Productivity
- Community Collaboration
- Quality of SW
- Open source SW & applications
**Agility** = Capability + Speed

**Agility** is the ability to get to market quickly and effectively to solve the business problems you care about by leveraging best-of-breed capabilities across eco-system, security and management, while benefiting from industry leading scale and performance.
Agility = Capability + Speed

Agility is the ability to get to market quickly and effectively to solve the business problems you care about by leveraging best-of-breed capabilities across eco-system, security and management, while benefiting from industry leading scale and performance.
Open Source in the Enterprise

<table>
<thead>
<tr>
<th>Open Source usage by the numbers</th>
<th>64% of companies participate in Open Source projects</th>
<th>67% of companies w/ &gt; 5k employees</th>
<th>78% of companies run on Open Source</th>
<th>66% of companies build software on Open Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>88% of companies to increase open source contributions in the next 2-3 years</td>
<td>39% Plan to start own external OSS project</td>
<td>Less than 3% don’t use OSS in any way</td>
<td>50% of companies say that more than half their engineers are working on open source projects</td>
<td>53% Expect to reduce barriers to employee participation</td>
</tr>
</tbody>
</table>
A new team in z Systems Software with the following mission:

- Create a rich open-source ecosystem to enable LinuxONE and IBM z Systems as a target platform for new application deployment.

**Scope:** Open Source Foundational Technologies for LinuxONE and IBM z Systems

**Stakeholders:**
- z Clients
- ISVs, Biz Part. & Distros
- IBM Sponsors and Product teams
- Communities

**Activities:**
- Port Test Performance
- Contribute changes
- Develop Go-to-Market strategy
- Available for Client team

**Foundational Technologies:**
- Dev Language & Environment
- Database & Messaging
- Cloud Infrastructure
- Big Data & Analytics
Open Source & ISV Linux SW Capability

**Tier 1: Foundation Packages***
- **Porting work**: for some packages, compilers, bug fixes, build script changes are required
- **“Dockerize”** all ports
- Working to get more engaged within these communities

<table>
<thead>
<tr>
<th>Languages and Dev Environment</th>
<th>Database &amp; Messaging</th>
<th>Cloud infrastructure</th>
<th>Big Data &amp; Analytics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Node.js</td>
<td>MySQL</td>
<td>Docker</td>
<td>Hadoop (via Veristorm, BigInsights)</td>
</tr>
<tr>
<td>Ruby</td>
<td>PostgreSQL</td>
<td>Docker Swarm/Compose</td>
<td>Drupal</td>
</tr>
<tr>
<td>Rails</td>
<td>MariaDB</td>
<td>Chef</td>
<td>ELK (Elasticsearch, Logstash, Kibana)</td>
</tr>
<tr>
<td>Python</td>
<td>MongoDB</td>
<td>Puppet</td>
<td>Apache SPARK</td>
</tr>
<tr>
<td>LLVM</td>
<td>Cassandra</td>
<td>OpenStack</td>
<td>Apache Kafka</td>
</tr>
<tr>
<td>OpenJDK, <em>OpenJDK JIT</em></td>
<td>Redis</td>
<td>Cloud Foundry</td>
<td>Joomla</td>
</tr>
<tr>
<td>GCCGO, Golang compiler</td>
<td>CouchDB</td>
<td>OpenShift</td>
<td>Solr</td>
</tr>
<tr>
<td>oCaml, oCaml native compiler</td>
<td>Geode</td>
<td>Kubernetes</td>
<td>SugarCRM</td>
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<tr>
<td>Erlang, <em>Erlang native compiler</em></td>
<td>RabbitMQ</td>
<td>Apache Mesos</td>
<td>Cloudera</td>
</tr>
<tr>
<td>Apache HTTP Web Server</td>
<td>CouchBase</td>
<td>Apache Flume</td>
<td>HortonWorks</td>
</tr>
<tr>
<td>PHP/Zend</td>
<td>Neo4j</td>
<td></td>
<td>Cloudera</td>
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<tr>
<td>R language</td>
<td></td>
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<tr>
<td>Clojure</td>
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<td></td>
<td>Apache Flume</td>
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<tr>
<td>Scala</td>
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<tr>
<td><em>Swift (Apple)</em></td>
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</table>

Various sources of input: e.g. BlueMix, Github stats, feedback from: direct client input, IBM client reps, on going research

* Content and priority are subject to change
## Tier 2: Popular Tools and Applications*

- Most packages just work on LinuxONE and IBM z Systems without porting effort, especially if written in Java or supported languages, and RHEL/SLES are among supported distros.
- “Dockerize” all ports
- Working to get more engaged within these communities

<table>
<thead>
<tr>
<th>App development &amp; DevOps</th>
<th>Configuration, monitoring management and tools</th>
<th>Web Application Development</th>
<th>eCommerce &amp; Application server</th>
</tr>
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<tbody>
<tr>
<td>Xerces-c</td>
<td>Fluentd</td>
<td>jMeter</td>
<td>jBoss</td>
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<tr>
<td>XMLSec</td>
<td>Ansible</td>
<td>Wordpress</td>
<td></td>
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<tr>
<td>protobuf</td>
<td>SaltStack</td>
<td>Ceilometer</td>
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<td>Doxygen</td>
<td>cAdvisor</td>
<td>Apache Tomcat</td>
<td>Magento</td>
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<td>ANTLR</td>
<td>virt-install</td>
<td>HAProxy</td>
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<tr>
<td>Apache Maven</td>
<td>Zenoss</td>
<td>NGNIX</td>
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<tr>
<td>Jenkins</td>
<td>Zookeeper</td>
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<tr>
<td>Apigility</td>
<td>DataDog</td>
<td></td>
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<tr>
<td>.Net</td>
<td>ElasticBox</td>
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<tr>
<td>Node.js extended components</td>
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</table>

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Validating packages per customer request
## Tier 2: Popular Tools and Applications* that have been verified by Sine Nomine Associates

<table>
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<tr>
<th>App development &amp; DevOps</th>
<th>System productivity tools</th>
<th>System configuration tools</th>
<th>System libraries</th>
</tr>
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<tbody>
<tr>
<td>pigz</td>
<td>Bacula</td>
<td>phpMyAdmin</td>
<td>db4</td>
</tr>
<tr>
<td>autosh</td>
<td>ipsec-tools</td>
<td>webmin</td>
<td>freetds</td>
</tr>
<tr>
<td>eXplorer-mod</td>
<td>netcat</td>
<td>dhcp_probe</td>
<td>libbibverbs</td>
</tr>
<tr>
<td>mono</td>
<td>openVPN</td>
<td>lighttpd</td>
<td>libapreq2</td>
</tr>
<tr>
<td>php-mcrypt</td>
<td>ossec-hids</td>
<td>mod-rpaf</td>
<td>libmcrypt</td>
</tr>
<tr>
<td>GeoIP</td>
<td>h3270</td>
<td>thttpd</td>
<td>libnet</td>
</tr>
<tr>
<td>php-pear-DB</td>
<td>s3270</td>
<td>scsi-target-utils</td>
<td>libsodium</td>
</tr>
<tr>
<td>php-php-gettext</td>
<td></td>
<td>HAO</td>
<td>openpgm</td>
</tr>
<tr>
<td>mock</td>
<td></td>
<td>heartbeat</td>
<td>pkcs11-helper</td>
</tr>
<tr>
<td>Perl Tools(e.g. perl-libapreq2, perl-Net-Ping...)</td>
<td></td>
<td></td>
<td>zeromq</td>
</tr>
</tbody>
</table>

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LinuxONE and IBM z
Open Source & ISV Ecosystem Community

• One stop shop to find out what is available

• Information on all open-source software
  – Recipes for building the software on LinuxONE and IBM z
  – Pointers to binaries if available
  – Other related news and information

• Build recipes and how-tos on GitHub
  – https://github.com/linux-on-ibm-z/docs/wiki/

• Open to every one interested in LinuxONE and IBM z
  – Users can post questions/comments
  – Provide feedback to the Open Source & ISV Ecosystem team

• We look forward to hearing from you!
Support for the LinuxONE Open Source & ISV Ecosystem

1. IBM via the Ecosystem enablement team & LTC (Linux Technology Center)

2. Select ISV relationships

3. Third Party Enterprise Support

4. Open Source Products embedded in the distros
2ndQuadrant is excited by combining the world’s most advanced open source database, PostgreSQL, with the world’s most efficient, trusted and secure server, the IBM z13. The results of up to 2x throughput performance far exceed our goal, and we are pleased to partner with IBM for supporting IBM's customers.

-- Simon Riggs, CTO & Founder, PostgreSQL Development at 2ndQuadrant

Chef, the leader in automation for DevOps, today announced it is collaborating with IBM to deliver integration between the Chef 12 Client & Chef 12 Server and IBM’s enterprise Linux mainframe offering, Linux on z Systems. “We’re experiencing rapid and accelerating adoption of Chef within the enterprise, making integration with IBM z Systems an important feature for our platform ...

-- Matt Ray, Director of Partner Integration, Chef.

“We are committed to make MongoDB available on all major platforms and are excited to add support for IBM z Systems’ Enterprise Grade Linux and LinuxOne Platform. This announcement is a leap forward for customers who want to deploy modern, mission-critical applications built with MongoDB and take advantage of the performance, scalability and security of IBM’s mainframe hardware products.”

--- Eliot Horowitz CTO & Founder, MongoDB

Docker is very pleased to be working with IBM to enable the Docker container capability for LinuxONE and IBM z Systems.

-- Ben Golub, CEO of Docker

IBM’s z Systems mainframes power some of the most mission critical services available. ... Having Puppet run on IBM z Systems not only helps realize these benefits in a mainframe environment, but speaks to the ubiquitous and flexible nature of open source Puppet.

-- Nigel Kersten, CIO of Puppet Labs

"As the ONE default database platform for leading Linux distributors, ..., MariaDB is excited to support IBM LinuxONE,” stated Patrik Sallner, CEO of MariaDB. “With Linux on IBM z growing at twice the rate of the Linux market overall, there is clear customer demand for open source solutions on IBM’s highly scalable and secure platform. These qualities align perfectly with MariaDB’s true open source model, which leverages Community innovations ..., for on-premise, hybrid and cloud applications.”

--Patrik Sallner, CEO, MariaDB Corporation

“It’s exciting to see the investment IBM is making into our open source technologies — Elasticsearch, Logstash and Kibana — with Linux on z Systems. This further expands the reach of our technologies in enterprises with mission critical deployments on mainframe systems.”

-- Shay Banon, CTO & co-founder of Elastic
IBM LinuxONE
Community Cloud

**GOAL:** Give developers, ISVs and students remote access to LinuxONE & IBM z

**ISVs**
- Available for ISV through PartnerWorld
- Hosted by IBM in Dallas, Boeblingen and Beijing
- Port, test, benchmark key applications
- **Available Now**

**Clients**
- Remote access environment free of charge for limited time
- Client Sandbox for Proof of Concept work to verify and test new apps and try new technologies
- **Available Now**

**Students & Developers**
- Free access to Developers Students, and Entrepreneurs
- Hosted by Partnership Universities: Syracuse, Marist and others
- Get a LinuxONE virtual machine in minutes
- **Available November 2015**
An Industry Use Case Observation

SINGLE VIEW aka 360 Degrees VIEW USE CASE

Application

Data processing

(central) data

Ingest ETL

Aggregation

vs

Federation
An Industry Use Case Observation

SINGLE VIEW aka 360 Degrees VIEW USE CASE

Scalable Financial Trading Analysis & Insights Demo

Stock trading platform leveraging SOI across SOE & SOR to provide an enhanced and optimized single view experience for the user

• Why did the stock value drop last Wednesday at 11:00am? Diagnostic
• Is there good/bad news on company X right now? Sentiment
• Company X on social media? Sentiment
• What are people in city Y / Z km around me investing in? Geospatial
• What will the stock price be in an hour based on historic trend? Predictive

• Auto-recommendation based on the above Prescriptive
• Is investing in company X a good idea based on: Sentiment analysis;
  Geospatial analytics, Predictive analytics; All of the above

SOI (systems of insights, SOE (systems of engagement), SOR (Systems of record)

IMPLEMENTATION

• Implemented via sharding across many server farms
• What about an approach that integrates everything into ONE server and leverages vertical scaling with better
  • Co location data-analytics-insights
  • Extreme virtualization
  • Security
  • Network latency
  • Availability & disaster recovery
  • Apps that don’t need to worry about clustering, ...

Aggregation
“Scalable Financial Trading Analysis & Insights” Live demo

https://www.youtube.com/watch?v=VWBNolwGEjo
LinuxCon Demo Architecture

- Nginx Load Balancer
- Systems of Engagement
- Spark + Node.js
  - Analytics (Spark as a Service)
- Apache Curator
  - Service discovery and registration
- MongoDB
  - NoSQL
- MariaDB
  - SQL
- PostgreSQL
  - SQL
- Apache Kafka
  - Message Queue (Ingestion)
- IBM
- Chef
  - System Orchestration
- IBM Services
- IBM Solutions for IoT
- IBM Watson
- IBM SmartCloud
- IBM Security
- IBM Easy Answers
- IBM Sales Acceleration Factory
- IBM Global Services

https://www.youtube.com/watch?v=VWBNolwGEjo
Agility is the ability to get to market quickly and effectively to solve the business problems you care about by leveraging best-of-breed capabilities across eco-system, security and management, while benefiting from industry leading scale and performance.
Open Technology SQL Data serving performance

MariaDB 10.1.5

1.8x to 2.1x throughput improvement on Sysbench Benchmark

PostgreSQL 9.4

1.6x to 2.2x throughput improvement on pgBench Benchmark
NoSQL Data serving performance: MongoDB

**Throughput**

- 1.9x to 2.1x throughput improvement on YCSB Benchmark

**Database Restore (MiB/Second)**

- Up to 7.5x reduction in elapsed-time to compress database: MongoDB, containing large documents

**Extreme Scale Up**

- Consolidate multiple MongoDB servers in one instance
  - Largest single node of MongoDB with a footprint of +2TB, processing +4B documents with sustained throughput and response time (<5ms).
  - Avoid the overhead, cost and complexity of distributing DB across many servers

**LinuxOne system using Node.js and MongoDB can handle over 30Billion web events/day (AcmeAir)!**

https://www.mongodb.com/mongodb-scale

- **Cluster Scale.** Distributing the database across 100+ nodes, often in multiple data centers – *LinuxONE single system scale up-vertical scaling*
- **Performance Scale.** Sustaining 100,000+ database read and writes / second while maintaining strict latency SLAs – *LinuxONE up to 470,000 database read and writes / second*
- **Data Scale.** Storing 1 billion+ documents in the database – *LinuxONE storing 4 billion+ documents in single instance*
• High Performance JavaScript for LinuxONE and IBM z
  – Up to 2.1x more RESTful web interactions with AcmeAir in node.js with Apache JMeter benchmark setup
Spark

- Up to **1.5x** faster insights for real-time analytics using Spark’s core primitives
- Up to **1.5x** more data processed for model building leading to real-time insights with higher accuracy within a given batch window

- Co-locate Spark with non IBM Database on LinuxONE outperforms running Spark off-platform up to **3x** for aggregation analytical query
  - e.g. Operational Analytics for a Brokerage running reports on top of OLTP Trading data

---

*Composite Mean Across 8 'Spark' Core Benchmarks*
HW Compression

- Up to **7.5x** reduction in elapsed-time to compress database: MongoDB, containing large documents

- Up to **4.9x** better throughput archiving Spark RDD on z13 with zEDC vs. software gzip compression

- Up to **4x** reduction in elapsed time to compress Docker containers on z13 with zEDC vs. SW gzip
Just Awesome Results!
Scalability, Performance, Security, Availability

**MongoDB, MariaDB, Postgres up to 2x faster**

**Docker Containers 1.5x**

**Node.js up to 2x faster**

**Compression Spark RDD 4.9x faster**

**Docker Persistence 4x faster**

**Spark Analytics up to 3x faster**

“**Single** MongoDB node on LinuxOne scales up to **2TBs** with sustained throughput and response time <5ms, while supporting **4Billion+ documents, 460,000 reads/writes/second**, with no Sharding required!”

“LinuxOne using Node.js and **multiple** MongoDB instances handles over **30Billion web events/day**!”
Questions?

Dale Hoffman (daleh@us.ibm.com)
Marcel Mitran (mmitran@ca.ibm.com)

Thank you!
Backup
Acknowledgements

• None of this work would be possible without the outstanding contributions from our Linux on System z Open Source Ecosystem Leadership Team, our Linux on System z Performance teams, Research, various technical contributors, the CPO, and those who ensured we would have the test HW available

• Demo Core team: Mohammad Abdirashid, Elton Desouza, Donna Dillenberger, Dale Hoffman, Marcel Mitran, Eberhard Pasch, Otto Wohlmuth, Ivan Dovgan

• Performance Leadership Team: Tarun Chopra, Raj Krishnamurthy, Qi Liang, Moriyoshi Ohara, Hartmut Penner, Stefan Wirag

• Ecosystem Leadership Team: Bryan Chan, Cindy Lee, Enyu Wang, Cheryl Fraser

• Technical Contributors: David Petersen, Brian Cooper, Gong Su

• CPO: Avijit Chatterjee, David Rhoderick

• Demo test: Tom Rozmus, Joe Stein
## Where to get Open Source Packages

<table>
<thead>
<tr>
<th>Assets</th>
<th>Where to get it?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ansible</td>
<td><a href="https://github.com/linux-on-ibm-z/docs/wiki/Building-Ansible">https://github.com/linux-on-ibm-z/docs/wiki/Building-Ansible</a></td>
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</table>
| Chef client & server    | [https://github.com/linux-on-ibm-z/docs/wiki/Building-Chef-client-12.1.2](https://github.com/linux-on-ibm-z/docs/wiki/Building-Chef-client-12.1.2)  
                          | [https://github.com/linux-on-ibm-z/docs/wiki/Building-Chef-server-12.0.4](https://github.com/linux-on-ibm-z/docs/wiki/Building-Chef-server-12.0.4) |
| CouchDB                 | [https://github.com/linux-on-ibm-z/docs/wiki/Building-CouchDB](https://github.com/linux-on-ibm-z/docs/wiki/Building-CouchDB) |
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<td>Docker Private Registry</td>
<td><a href="https://github.com/linux-on-ibm-z/docs/wiki/Building-Docker-Distribution">https://github.com/linux-on-ibm-z/docs/wiki/Building-Docker-Distribution</a></td>
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<td>Fluentd</td>
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<td>Go (GCCGO)</td>
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<td>HAProxy</td>
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# Where to get Open Source Packages

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<tr>
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<td>oCaml Interpreter</td>
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<td>PostgreSQL</td>
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<td>RabbitMQ</td>
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<td>Ruby-on-Rails</td>
<td><a href="http://guides.rubyonrails.org/getting_started.html">http://guides.rubyonrails.org/getting_started.html</a></td>
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<td>Redis</td>
<td><a href="https://github.com/antirez/redis/blob/unstable/README.md">https://github.com/antirez/redis/blob/unstable/README.md</a></td>
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<td>Snappy-Java</td>
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</table>
## Enabling Open Source Docker for z Customers

<table>
<thead>
<tr>
<th>Item</th>
<th>Content</th>
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</table>
| **Docker binaries**   | • Open Source Docker for RHEL 7 and SLES 12  
• GOLANG version to be released YE 15  
• “HowTo” Document for first steps: [http://containerz.blogspot.com/](http://containerz.blogspot.com/)  
• Docker is Docker is Docker … on Linux on Z too!                                                                                       |
| **DockerCompose**     | [https://github.com/linux-on-ibm-z/docs/wiki/Building-Docker-Compose](https://github.com/linux-on-ibm-z/docs/wiki/Building-Docker-Compose)                                                                 |
| **Docker Swarm**      | [https://github.com/linux-on-ibm-z/docs/wiki/Building-Docker-Swarm](https://github.com/linux-on-ibm-z/docs/wiki/Building-Docker-Swarm)                                                                  |
| **Docker Files**      | [https://www.ibm.com/developerworks/community/forums/html/topic?id=1b477437-0f63-496c-8e3b-e18e06353d43](https://www.ibm.com/developerworks/community/forums/html/topic?id=1b477437-0f63-496c-8e3b-e18e06353d43) |
| **Private Registry Creation** | Instructions on setting up and building base images:  
[http://containerz.blogspot.ca/2015/03/first-steps-with-docker.html](http://containerz.blogspot.ca/2015/03/first-steps-with-docker.html)  
[http://containerz.blogspot.ca/2015/03/creating-base-images.html](http://containerz.blogspot.ca/2015/03/creating-base-images.html)  
• Create a Docker image that runs a private repository on Linux on:  
[https://github.com/linux-on-ibm-z/docs/wiki/Building-Docker-Distribution](https://github.com/linux-on-ibm-z/docs/wiki/Building-Docker-Distribution) |
| **Contacts**          | Dale Hoffman ([daleh@us.ibm.com](mailto:daleh@us.ibm.com)) for Docker use cases and customer input  
Utz Bacher ([Utz.Bacher@de.ibm.com](mailto:Utz.Bacher@de.ibm.com)) for binary & “HowTo” critique  
Cindy Lee ([cinderel@ca.ibm.com](mailto:cinderel@ca.ibm.com)) for Docker files, class, PoC |
Why LinuxONE?

• **Speed & Agility => More function and capability with less**
  – LinuxONE provides 1.5x better Java performance (fastest threads and largest caches in the industry)
  – Databases run 2x better on LinuxONE (lots of dedicated I/O co-processors)
  – Collocating database and app-server (typical on LinuxONE, atypical on alternate platforms) with performance up-to 3x better
  – Hybris cloud uses in-memory caching which depends inherently on large and fast memory
    • Scaling of Mongodb to 2TB maintained <5ms response-times reading from the DB on LinuxONE
    • Nearest equivalent on alternate platforms shows 60ms latency performing the same operation

• **Vertical Scale => Simpler, more resilient, more secure**
  – Database component of the solution scales vertically, and fits in a single box, instead of having to be spread across many smaller boxes
    • One box instead of many means reduced operational complexity, improved resilience, simpler security
  – Designed for consolidation: 100s of distributed servers -> 1 LinuxONE
  – Runs more instances of Hybris cloud in a single footprint
    • Significantly reduces S/W licensing cost for products like OracleDB
    • Reduces operational cost as managing a single box means less to manage
    • Simplifies operation environment and improves resilience (less moving parts, less likely to break)

• **Security and high-availability**
  – Industry leading security
  – GDPS capability means datacenter doesn't miss a beat moving workload to a back-up system
Introducing IBM LinuxONE™

IBM LinuxONE™: Linux Without Limits

IBM LinuxONE™ and Open Source Demo

Introducing IBM LinuxONE: Announcement webinar

Just Launched!
And the family of IBM LinuxONE SOLUTIONS

Build the premier **mobile** solution for your business to deliver the best possible experience for your clients, employees, and partners.

Create an agile and trusted **cloud** infrastructure to meet new business demands with greater efficiency and lower costs for IT service delivery.

Extract insights from your data faster and scale effortlessly to meet big data and **analytics** demands.

Realize quicker time to value, and higher customer satisfaction, through iterative **development** and continuous improvement.
## Solutions:
**Designed for the Digital Economy**

<table>
<thead>
<tr>
<th>Solution</th>
<th>Use Cases</th>
<th>LinuxONE Value</th>
<th>Enabling Technologies &amp; Services</th>
</tr>
</thead>
</table>
| **Mobile** | - Agile Development and Delivery of Mobile Apps  
- Integration with Core Systems of Record  
- Secure End-to-End Mobile Transaction  
- Personalized Mobile Experience Through Analytics | - Secure mobile devices, data and enterprise transactions without sacrificing response time  
- Deliver mobile services on an open and highly responsive infrastructure that meets the peaks in mobile workloads | - IBM MobileFirst Platform Foundation, MobileFirst Platform Custom Pattern for Linux, MobileFirst Protect, API Management, IBM Integration Bus, Urban Code Deploy, IBM Rational Collaboration Lifecycle Management, IBM Rational Developer for the Enterprise, DataPower, WebSphere Application Server  
- LinuxONE Mobile Services |
| **Analytics** | - High Performance Business Intelligence and Reporting  
- Big Data Insights and Next Generation Database  
- IT Operational Analytics for Continuous Business Availability | - Maintain a high-performing business analytics and data warehousing solution without added complexity or cost  
- Scale up to more users and out to more data while containing costs and reducing complexity  
- Cost effectively meet the availability expectations of business  
- Reduce data center complexity and cost with more efficient administration and facilities management | - Cognos, Cognos Custom Pattern for Linux, DB2, DB2 Custom Pattern for Linux, DB2 BLU, BigInsights, IT Operational Analytics, IBM zAware, Spark  
- LinuxONE Analytics Services |
| **Cloud** | - Cloud Platform for Enterprise Systems of Record  
- Cloud Platform for Any Database Workload  
- Cross Platform Hybrid Cloud Solution | - Provide agility and time to value with unparalleled qualities of service for business-critical applications  
- Enable cloud solutions with uncompromised system uptime, airtight data security, and powerful vertical scalability  
- Deliver high performance and optimize for efficiency | - z/VM and KVM, Wave, Infrastructure Suite for z/VM and Linux, UrbanCode Deploy with Patterns, Custom Patterns for Linux, IBM Cloud Manager with OpenStack, VMware vRealize Automation *(requires ICM for z/VM)*, VMSecure, zVPS  
- LinuxONE Cloud Services |
| **DevOps** | - Develop, test, deploy and operate enterprise-level applications  
- Accelerate software delivery by enabling collaborative development and automation across organizational silos.  
- Enable developer productivity starting from scratch, open source, or Bluemix, across platform, and languages. | - Complete management and automation of the software development cycle.  
- Freedom to choose the right development tools for the job and unify development across platforms  
- Quick feedback and low cost of entry to nimbly incorporate improvements into future iterations | - Rational Collaborative Lifecycle Management (CLM), Urban Code Deploy, IBM Application Performance Manager (APM)  
- WAS Liberty, Bluemix  
- LinuxONE DevOps Services |
Bring together under a formal structure, an open source, technical community with a mutual interest in advancing the surrounding ecosystem and adoption of Linux on the mainframe as an enterprise-grade platform.

Open collaboration across academic, government and corporate partners to advance z Systems as an enterprise-grade platform for Linux.

Design and develop shared technology elements.

Provide development and test resources through a collaboration hub that lowers barriers to joint development activities.

Provide access to free education and information.

Improve the experience of users of the mainframe platform when running Linux.
VMware vRealize Automation (vRA) can provision & orchestrate virtualized IBM Power & z Systems workloads

- **Client Value** – Now clients have an Open interface to provision z System and Power System workloads using VMware cloud management tool while supporting a single tool and pane of glass interface!

- **Infrastructure as a Service (IaaS)** - Utilize vRA as the cloud management software to pass workload management requests via OpenStack API’s (Juno) to IBM’s PowerVM, PowerKVM, z/VM and KVM on z

- **Platform as a Service (PaaS)** – Install scripted applications and workflows via IBM CloudBuilder
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<table>
<thead>
<tr>
<th>Chip hopper</th>
<th>developerWorks*</th>
<th>FlashSystem</th>
<th>HyperSwap*</th>
<th>IMS</th>
<th>PR/SM</th>
<th>z/Architecture*</th>
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<td>LinuxONE Emperor</td>
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<td>z/VSE*</td>
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<td>FICON*</td>
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