Enterprise Grade Platform for Linux

Lunch & Learn

Session 17939

Bryan Foley

August 11, 2015

Leaders of Industry

run on System z

92 of the top 100 worldwide banks[1]

23 of the top 25 US retailers[2]

10 out of 10 of the world's largest insurers[3]

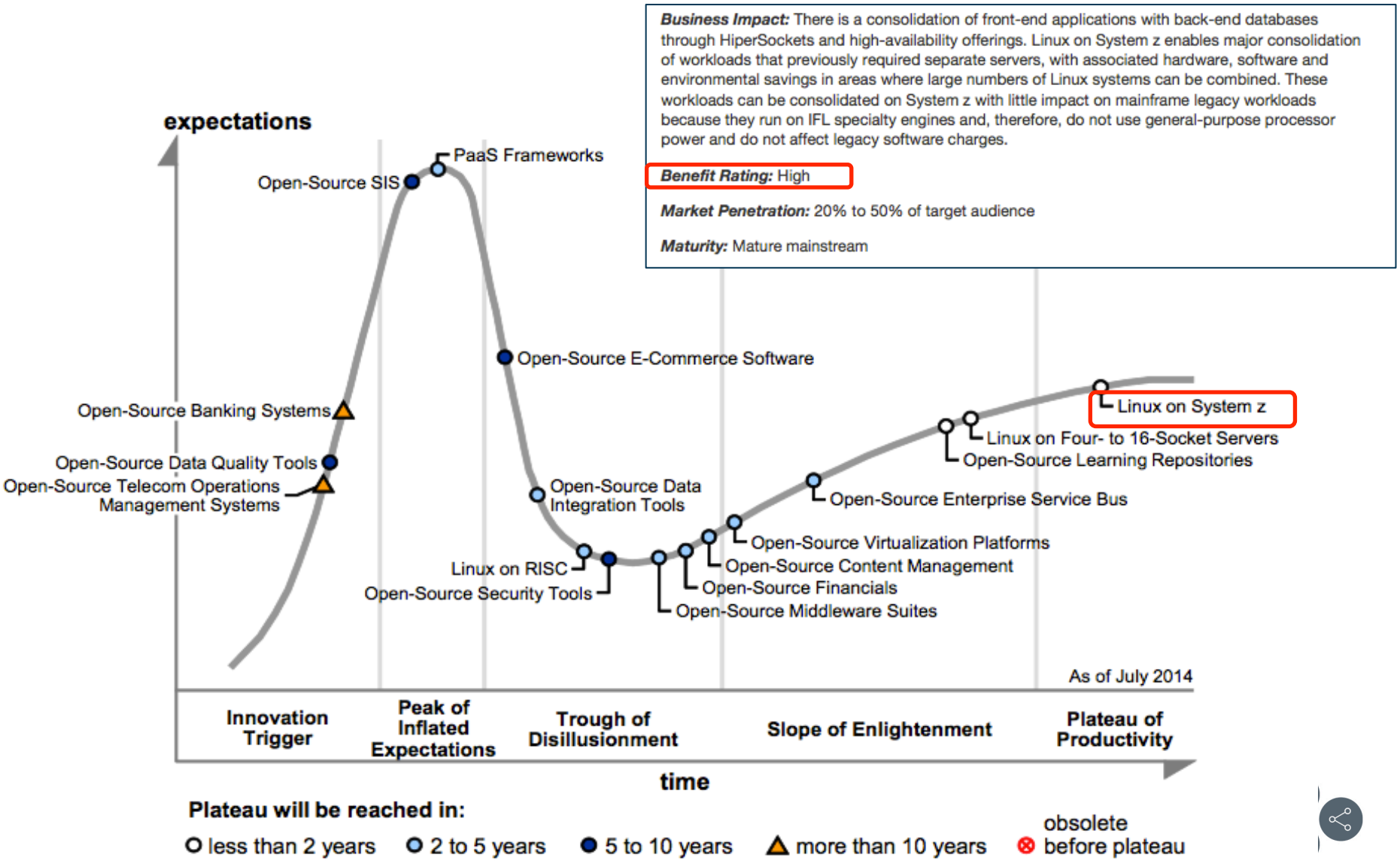
23 out of 25 of the world's largest airlines

1 Based on 'The Banker', System z install base and financial records
2 Based on IBM market development and insights documentation on top 25 ranked by Fortune 500 listing.
3 Based on IBM market development and insights documentation on top 10 insurance companies, ranked by non-banking assets.
4 Based on the amount of passengers carried each year

Source

Gartner 2014: Hype Cycle for Open-Source Software

Published: 30 July 2014

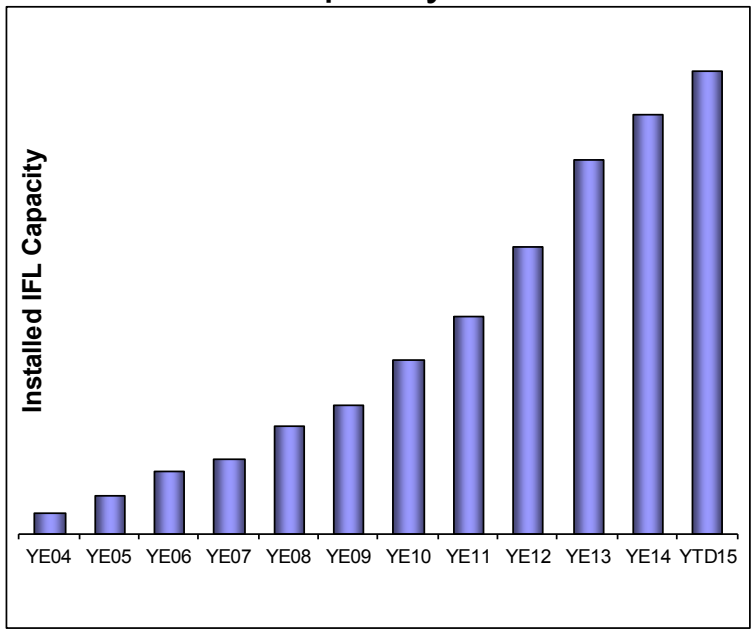


Linux on IBM System z in 2Q 2015

*Installed Linux MIPS at 45% CAGR**

- **26.7% of Total installed MIPS run Linux as of 2Q15**
- **Installed IFL MIPS increased by 16% YTY from 2Q14 to 2Q15**
- **39% of System z Customers have IFL's installed as of 2Q15**
- **79 of the top 100 System z Customers are running Linux on the mainframe as of 2Q15 ****
- **67% of new FIE/FIC System z Accounts run Linux**
- **35% of all System z servers have IFLs**

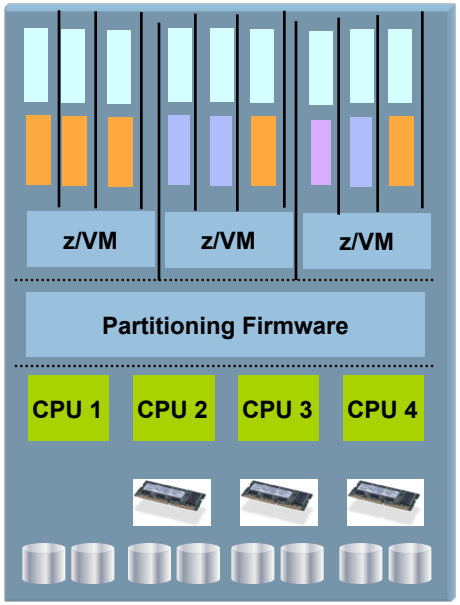
Installed Capacity Over Time



*Based on YE 2003 to YE 2014
**Top 100 is based on total installed MIPS

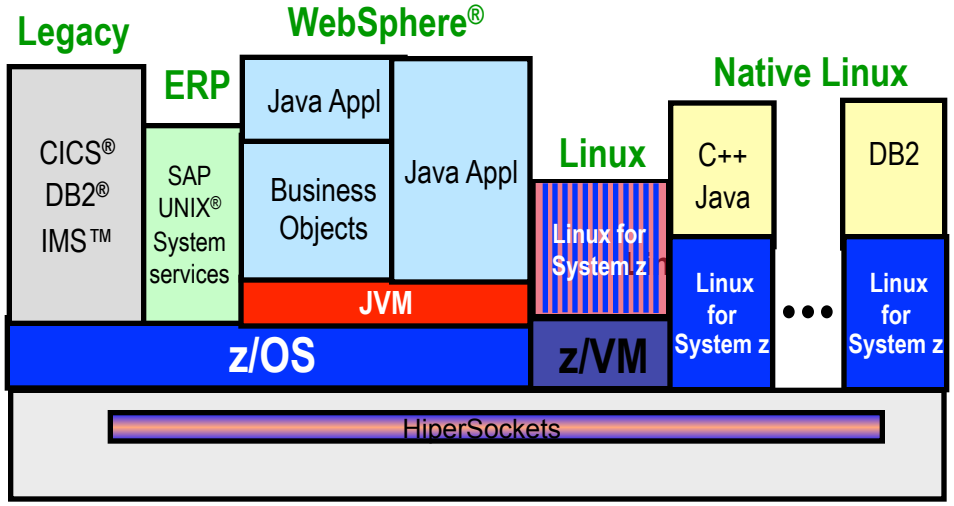
The Ultimate Virtualized System

IBM Mainframe



- **Utilization often > 80%**
- Handles **peak workload utilization of up to 100%** without service degradation for high priority workloads

- Massive, robust consolidation platform
- 60 logical partitions, 100's to 1000's of virtual servers under z/VM
- Virtualization is built in, not added on (Processor and I/O)
- HiperSockets for memory-speed communication, as well as Virtual Hipersockets via Guest LANs in z/VM
- Most efficient hypervisor function available
- Sysplex (Single System Image Clustering)
- Intelligent and autonomic management of diverse workloads and system resources based on business policies and workload performance objectives:



Multidimensional Virtualization

Very large Shared Resource Space

Allows for consolidation and tight integration of Large Server Farms

into

VIRTUAL "BLADES"

VIRTUAL "RACKS"

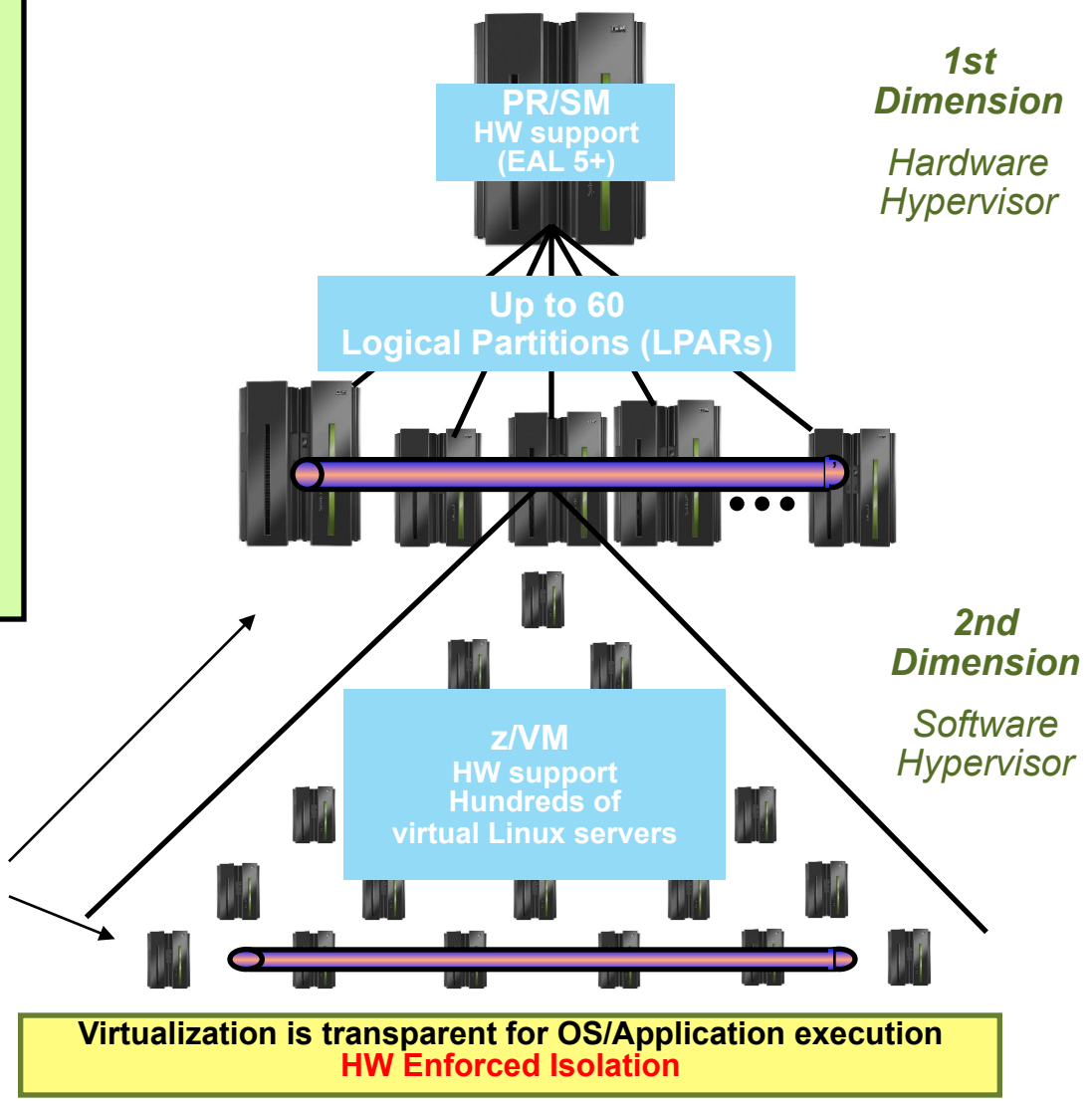
VITUAL NETWORKS

on the same footprint with managed performance, QoS and HW enforced security isolation

High speed (multiple GB/sec) and low latency interconnect

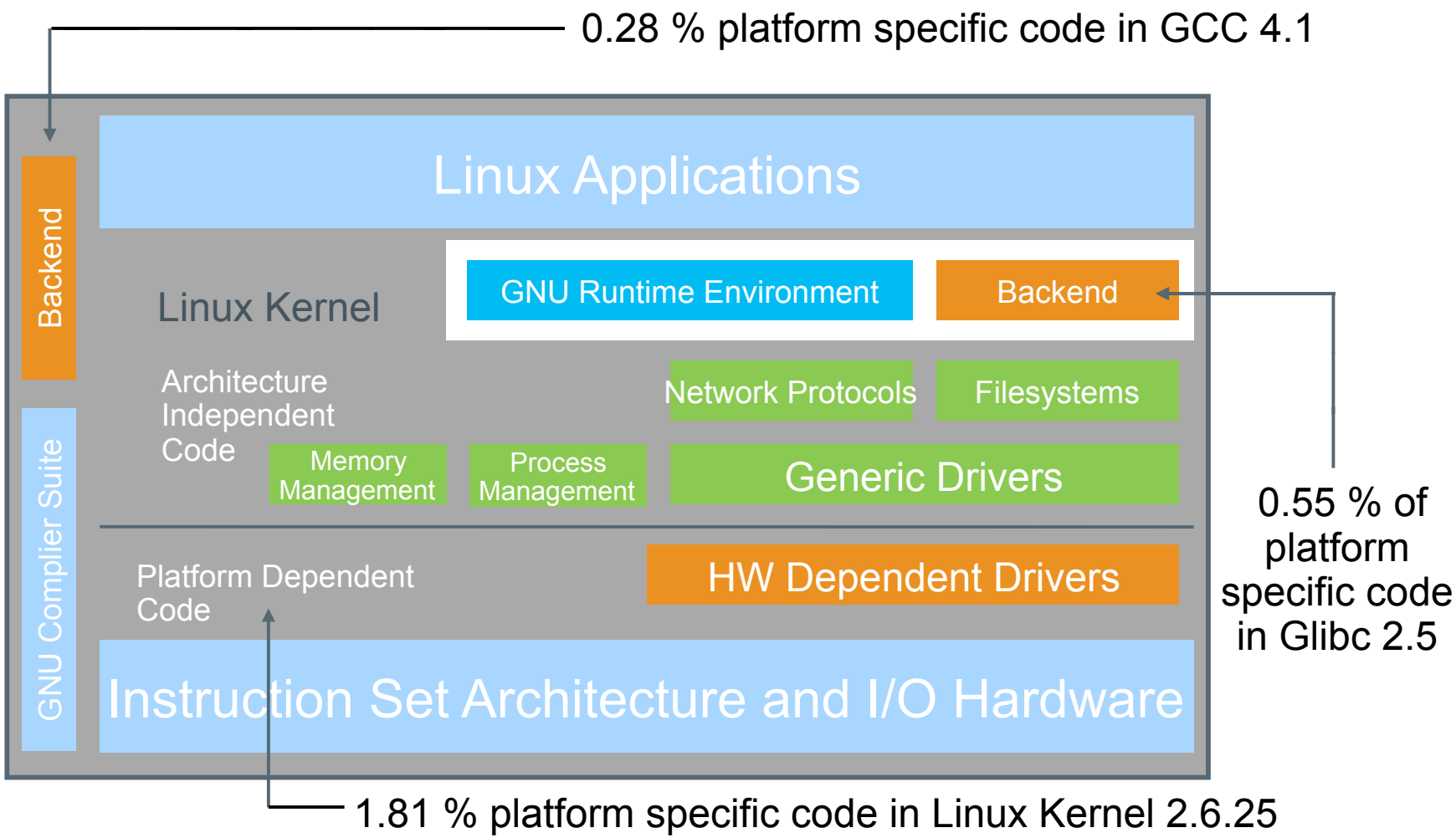
For integration with full integrity/ isolation

The power of many
The simplicity of one



Structure of Linux on System z

Many Linux software packages did not require any code change to run on Linux on System z

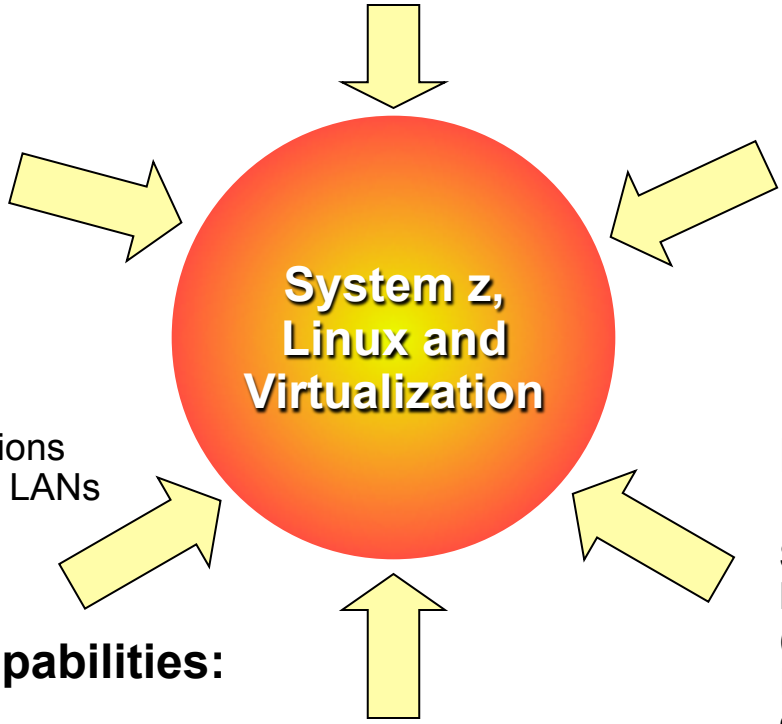


Linux is Linux…

… but System z provides unmatched value propositions to Linux workloads

Consolidation Capabilities:
Server, Network, Storage, Staff, Skills, Utilities, Environmental,
Applications Hosting of different workloads at the same time

Security Capabilities:
Privacy,
Regulatory requirements,
Identity management,
Common Criteria Certification,
Ethical hacking by research,
Image Isolation,
Cryptographic Acceleration,
Centralized Authentication,
Physically secure communications
with HiperSocketsand Guest LANs



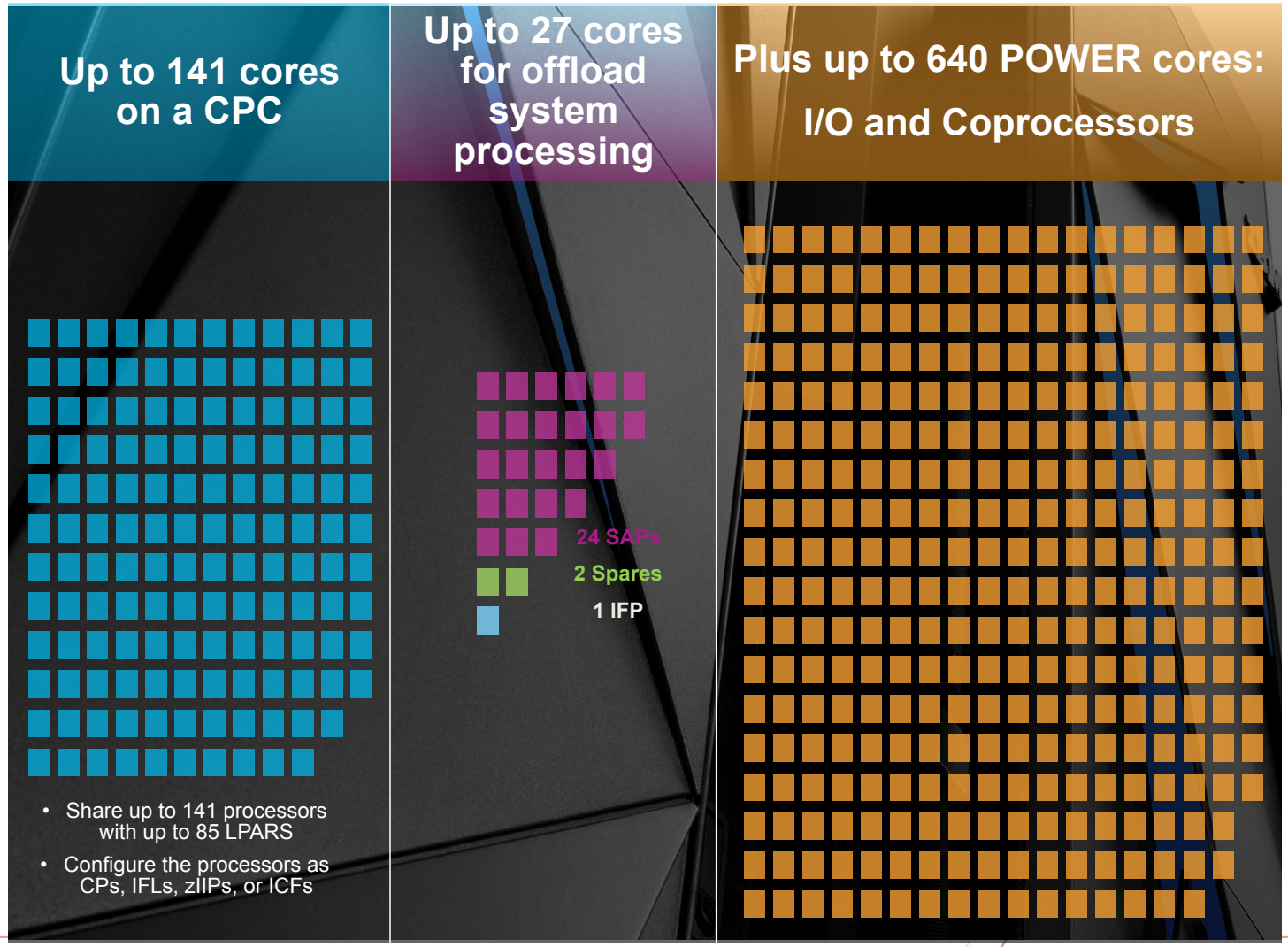
Business Resiliency Capabilities:
High Availability,
Disaster Recovery,
Serviceability, Reliability,
Storage failover (HyperSwap),
Data replication (XRC, PPRC)

Flexibility / On demand Capabilities:
Scale-up & scale-out,
Rapid server
(de-)commissioning,
Idle Servers don't
consume resources

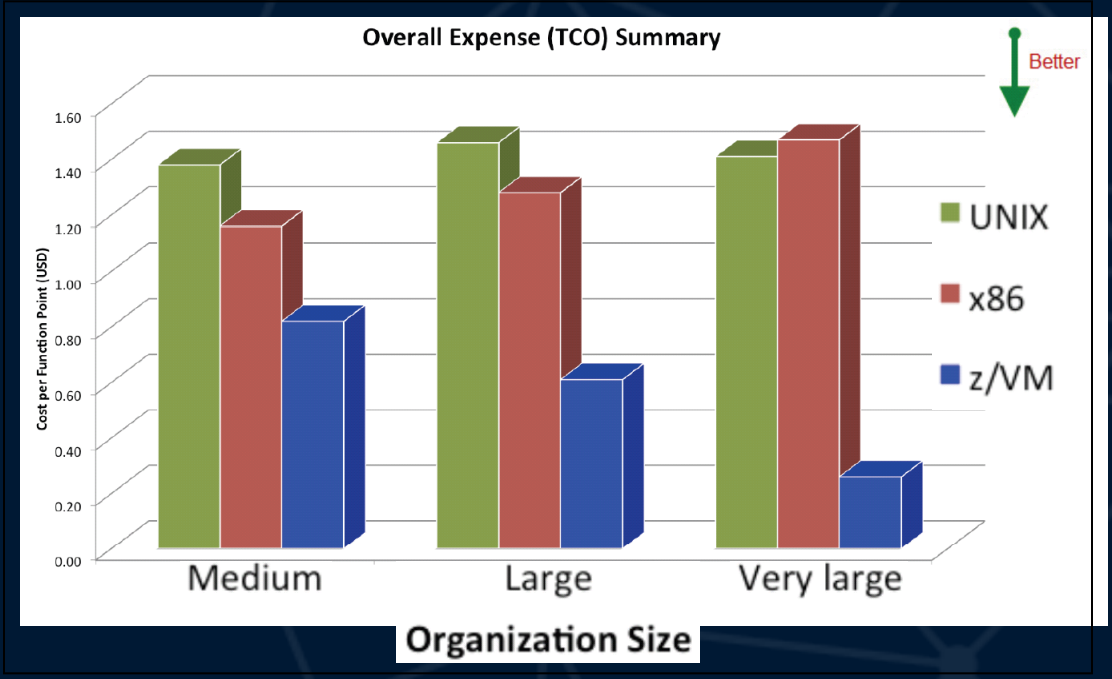
Operational Simplification Capabilities:
Virtualization,
Simulation,
Single Point of Control,
Single System Image,
z/OS Similarities/Synergies,
Resource Sharing

Proximity to z/OS managed Data:
Increased transaction throughput,
HiperSockets
Shared data access
Integrated storage management

Balanced System Design:
I/O and coprocessors bring added compute power to workloads



Comparing Virtualization Alternatives



SOLITAIRE INTERGLOBAL

Comparing Virtualization Alternatives – What's best for your business?

A quantitative analysis of the business differentiators among x86, Unix, and System z virtualization technologies

1. Introduction

Virtualization on an enterprise level has developed into a significant strategy for organizations that are watching costs, but do not want to adversely impact service levels. The increasing need for agility in market response is also pushing more and more organizations to implement virtualization on an organizational level, with more and more production VM images being deployed every day. Virtualization provides both an isolation and prioritization of resources that allows a single platform to function as if it were split into multiple machines. The conjunction of today's technology-driven business marketplace with the economic clime pushes organizations into a continual search for higher efficiencies and better leveraging of IT resources.

Virtualization is one of the most powerful tools in the achievement of increased leverage and efficiency of those resources, while positioning organizations strategically for a cloud-computing model. The choice of virtualization method and platform can be challenging, as businesses struggle to understand the change in challenges to their information delivery processes, support staffing and the different, critical decision elements that need to be considered. Since the impact of virtualization forms an underlying contribution to an organization that is a diffuse layer within the IT infrastructure, IBM engaged Solitaire Interglobal Ltd. (SIL) to conduct surveys, gather data and perform analysis to provide a clear understanding of the benefits and relative costs that can be seen when organizations implement IBM z/VM as part of their IT architecture. This analysis has been primarily directed at the value of virtualization from a business perspective, so that those whose role it is to provide business leadership can understand the benefit of the IBM z/VM virtualization offerings when evaluating its selection.

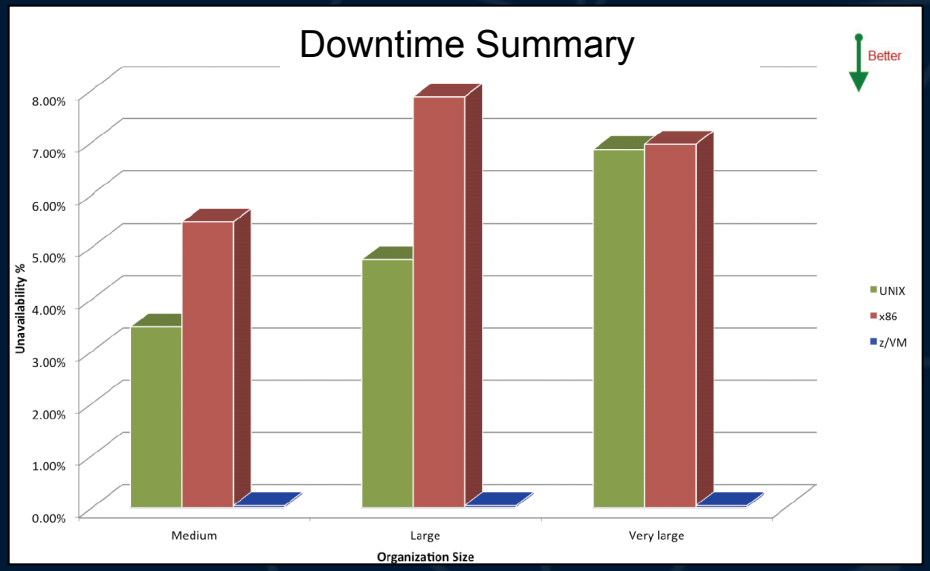
During this study, the main behavioral characteristics of software and hardware were examined closely, within a large number of actual customer sites (79,360+). All of these customers include organizations that have deployed virtualization as part of their production environments. This group has organizations that maintain both single virtualization standard and those that allow a heterogeneous mixture of virtualization methods and mechanisms. The information from these customer reports, and the accompanying mass of real-world details is invaluable, since it provides a realistic, rather than theoretical, understanding of how the use of different types of virtualization can affect the customer.

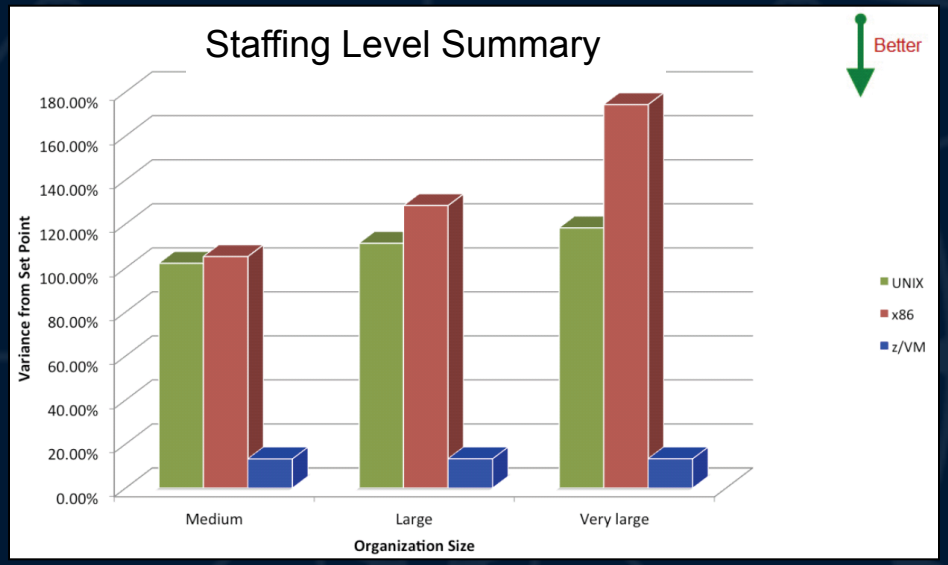
Telephone 847.931.9100
Website www.sil-usa.com
180 South Western Avenue, # 275
Carpentersville, Illinois 60110

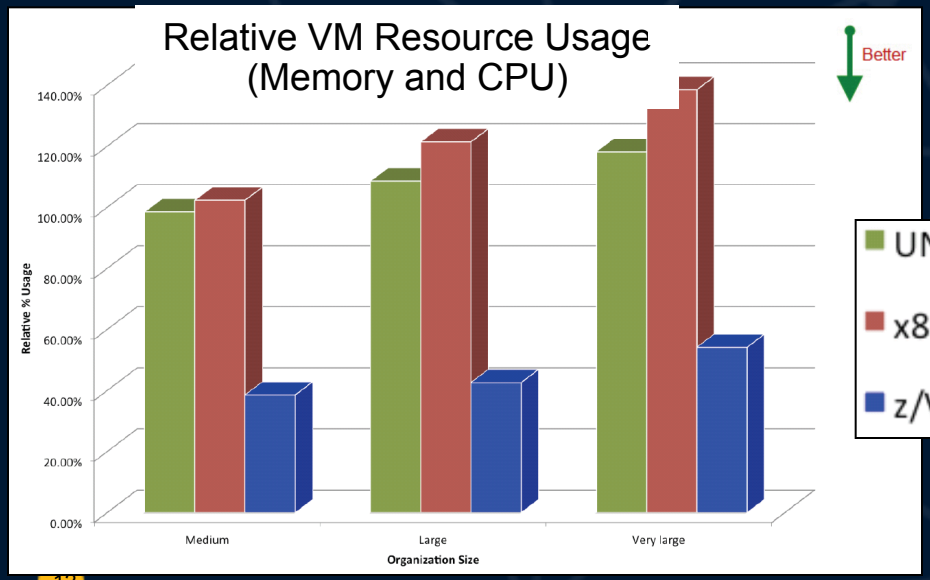
- During this study, the main behavioral characteristics of SW and HW were examined closely, within a large number of actual customer sites (79,360+).
- All of these customers include organizations that have deployed virtualization as part of their production environments.

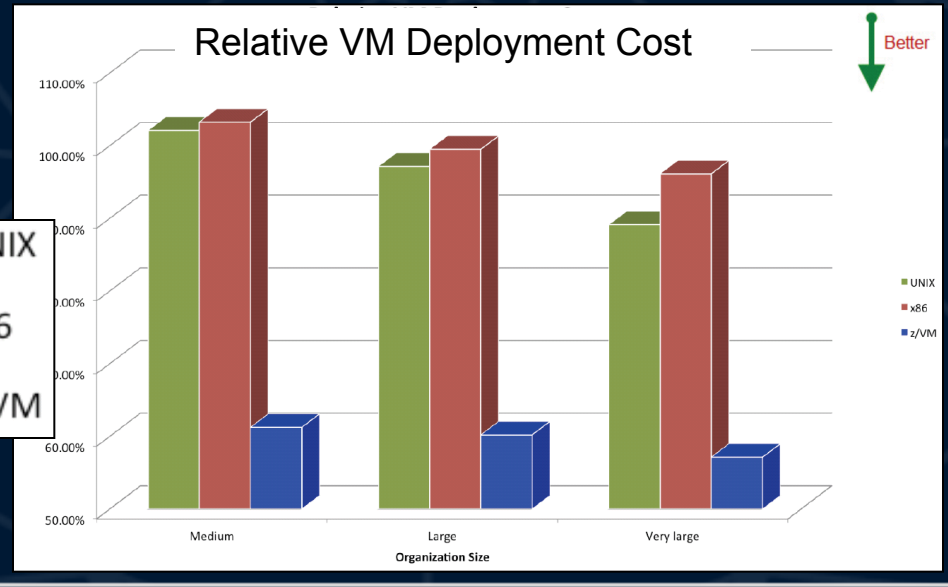
http://www-01.ibm.com/common/ssi/cgi-bin/ssialias?subtype=WH&infotype=SA&appname=STGE_ZS_ZS_USEN&htmlfid=ZSL03192USEN&attachment=ZSL03192USEN.PDF

Solitaire Interglobal study

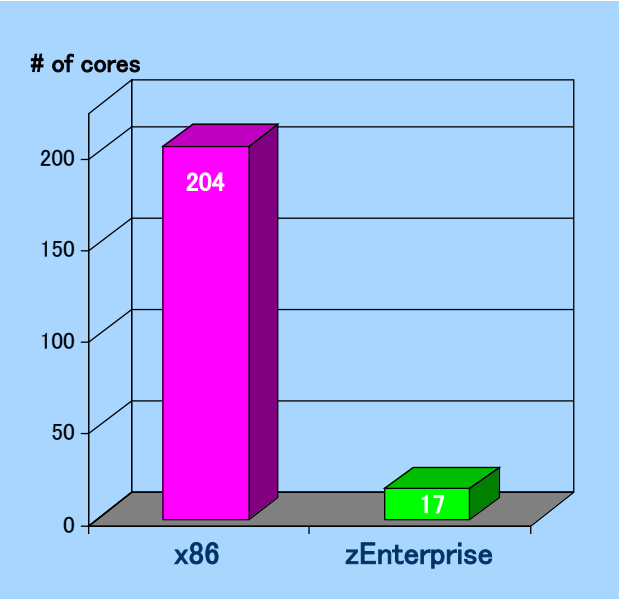








Enomous Saving in Software Costs



Consolidating from
204 x86 cores to 17 IFLs

The high processor utilization on IBM zEnterprise® also contributes to the software savings.

Met Office

"Commodity x86-based systems do cost far less to acquire ... But the longer-term costs quickly add up."

Richard Cains, technical lead, mainframe team, the Met Office

- Approximately 75 percent reduction in software costs
- Consolidation ratio of approximately 12:1

Independent analysis confirms that companies with mainframe-biased IT achieve lower IT costs per unit of delivery

Industry	Measure	Average IT Cost of Goods	Mainframe Biased	Distributed Biased	% Mainframe Cost Less Than Distributed
Bank	Per Teller Transaction	$0.31	$0.12	$0.35	66%
Mortgage	Per Approved Loan	$263.67	$98.38	$290.80	66%
Credit Card	Per Transaction	$0.16	$0.10	$0.18	44%
Railroads	Per Ton Mile	$0.0014	$0.0012	$0.0018	33%
Armed Service	Per Person	$8,036	$6,871	$9,839	30%
Automotive	Per Vehicle	$333	$275	$370	26%
Retail	Per Store (Door)	$494,818	$421,346	$560,300	25%
Utilities	Per MegaWatt Hour	$2.63	$2.21	$2.94	25%
Hospitals	Per Bed per Day	$64.30	$54.4	$71.7	24%
Oil & Gas	Per Barrel of Oil	$2.10	$1.78	$2.32	23%
Consulting	Per Consultant	$53,060	$48,900	$62,344	22%
Trucking	Per Road Mile	$0.177	$0.155	$0.194	20%
Airlines	Per Passenger Mile	$0.007	$0.0061	$0.0076	20%
Chemicals	Per Patent	$57,717	$55,800	$59,552	6%
Web Sites	Per Search	$0.042	$0.046	$0.041	-12%

BARCLAYS **"System z provides 98% of the work, 2% of the floor space and 7% of the IT cost."**

From Rubin Worldwide analysis of customer data and Gartner Research IT costs

Most common workloads for Linux on System z

Database deployment

- EVERTEC
- L3C LLP
- Dundee City Council
- **Met Office** *cut licensing costs by a factor of 12*
- Banrisul

Web application and SOA infrastructure

- BTMU
- Halkbank
- SinfoniaRx
- Bank New Zealand

Real-time insights

- Sicoob
- **White Cube** *runs an centralized approach for integration*
- Bankia
- Miami-Dade County
- IBM

… and much more

- Banca Carige
- **German Pension Fund** *relies on the extreme reliability and availability*
- Baldor
- Porto Alegre
- IBM

Links to client cases in backup

LinuxCon
August 17-19, 2015
Seattle, WA
Sheraton Seattle

LinuxCon NA brings together 1,500 technical open source professionals (85% from US) to hear the latest news about Linux, Cloud and Containers.

Livestream of event sessions:
http://events.linuxfoundation.org/events/linuxcon-north-america/program/live-video-stream

Linux on z Systems Open Source Ecosystem CoC

- *A new team in z Systems Software with the following mission:*
  - *Create a rich open-source ecosystem to enable Linux on z Systems as a target platform for new application deployment.*
  - *Scope: Open Source Foundational Technologies for Linux on z Systems*

Stakeholders	z Clients	ISVs, Biz Part. & Distros	IBM Sponsors and Product teams	Communities
Activities	Port Test	Contribute changes	Develop Go-to-Market strategy	Available for Client team
Technologies	Dev Language & Environment	Database & Messaging	Cloud Infrastructure	Analytics and Big Data

- Providing external HW access for developers through Syracuse & Marist University
- Participating in Bountysource.com to provide bounties for specific open source packages, building tool chains, bug fixes or performance enhancements

Open Source Linux SW Porting Completions & 2H15 Activity

Ported - complete
Work in progress
To be started

Tier 1: Foundation Packages *

- **Focus areas**: languages, databases, messaging, and cloud infrastructure
- **Porting work**: for some packages, compilers, bug fixes, build script changes are required
- The intent is to "dockerize" all ports

Languages and Dev Environment	Database & Messaging	Cloud infrastructure
Node.js	MySQL	Docker
Ruby	PostgreSQL	Chef
Rails	MariaDB	Puppet
Python	MongoDB	Openstack
LLVM	Cassandra	CloudFoundry
OpenJDK, OpenJDK JIT	Redis	OpenShift
GCCGO, Golang compiler	CouchDB	
oCaml, oCaml native compiler	Cloudant (not open source)	
Erlang, Erlang native compiler	CouchBase	
Apache HTTP Web Server	Gemfire	
PHP/Zend	RabbitMQ	
R language	Neo4j	
Clojure		
Scala		
Swift (Apple)		

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*

Open Source Linux SW Porting Completions & 2H15 Activity

Tier 2: Popular Tools and Applications*

- **Focus areas**: dev tools, configuration management, big data analytics, web development, ecommerce, application server
- Many of these packages should just work on Linux on z without porting effort, especially if they are written in Java or supported languages and RHEL/SLES are among supported distros.
- The ecosystem team is validating following packages per customer request
- The intent is to "dockerize" all ports

Ported - complete
Work in progress
To be started

App development & DevOps	Configuration, monitoring management and tools	Big Data & Analytics	Web Application Development	eCommerce & Application server
Xerces-c	Fluentd	Hadoop not open source - Veristorm & BigInsights)	jMeter	Magento
XMLSec	SaltStack	Apache Hadoop	Wordpress	X-Cart
protobuf	cAdvisor	HortonWorks	Ceilometer	jBoss
Doxygen	virt-install	Apache SPARK	Apache Tomcat	
ANTLR	Ansible	ELK (Elasticsearch, Logstash, Kibana)	HAProxy	
Maven	Zenoss	SugarCRM	NGNIX	
Apigility	Zookeeper	Apache Kafka		
.Net	DataDog	DruPal		
Node.js extended components	ElasticBox	Joomla		
Jenkins		Solr		

** Content and priority are subject to change*

Linux on z Open-source Ecosystem Community – Phase 1

- We have created a developerWorks community; visit us today!
  - https://www.ibm.com/developerworks/community/groups/community/lozopensource/
- Information on all open-source software we have brought to Linux on z:
  - Recipes for building the software on Linux on z
  - Pointers to binaries if available
  - Other related news and information
- Source code repositories and build instructions maintained on GitHub
  - https://github.com/linux-on-ibm-z/docs/wiki/
- Open to every one interested in Linux on z Systems
  - Users can post questions/comments regarding Linux on z
  - Give feedback to the Linux on z Open-source Ecosystem team
- **We look forward to hearing from you!**

Thank you!

Bryan Foley

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Strategy & Linux on z System
Business Line Manager

IBM

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