IBM z Systems and LinuxONE
An Open Source Success Story – History, Current Status and Outlook
Session: BOV90887

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Marcus Kraft – SUSE Linux Enterprise Product Manager (mkraft@suse.com)
Agenda

• Why LinuxONE or Linux for z Systems?
• Success stories
• z Systems, LinuxONE and SUSE a successfully partnership
• Product portfolio
• Technology outlook
• SUSE future strategy
• Where to start?
Market Needs and Expectations

Challenges of managing and controlling technology in a changing world

**Mainframes to coexist with distributed and cloud**
- Need high I/O bandwidth, higher utilization and better computing scalability that is affordable

**Growing complexity and needs to keep it simple**
- Struggle to host I/O and data-intensive workloads in virtual servers with acceptable levels of performance, scalability, availability, capacity planning, or disaster recovery

**Traditional workloads plus Analytics, Big Data, DevOps**
- Host hundreds of virtual servers running a mix of workload types; need rock-solid security

**Lower operational costs and deliver business value**
- Are experiencing or projecting IT growth and want a better way to manage that growth with z/VM

**How do we attract new talent?**

- Attract new talent and supply them with the education and support required
Two Distinct Brands

IBM z Systems

Products & Naming
- z13
- IFL
- GDPS
- IDAA
- DS8K
- zVM

Target
- Traditional Install Base / Core Business Expansion
- CIO/CTO
- VP, IT Operations
- Data Center Managers

Workloads
- Mixed Workloads
- Mobile & Business Process
- OLTP with z/OS SOR
- In-Transaction Analytics
- z/OS Services, Bluemix

Personality
- Proven, Vital, Optimistic, Inspiring, Future Driven
- Premier Data & Transaction Engine for Global Economy
- Engine of Progress for Digital Business

Visual Toolkit
- Traditional yet sleek and innovative
- Solid black with blue accents
- Varied configurations of triangular shapes

Launch Strategy
- Generational Cycle (generational designation)
- IBM Events & Roadshows
- zBLC & Premier Events

IBM LinuxONE

Emperor, Rockhopper
LinuxONE Core
High Availability Appliance
Spectrum Storage / GPFS / Storwize
KVM

New Buyers / New Markets / MSP
- CTO
- Linux Developers
- Architects

Linux Apps / Cloud
- Database Consolidation
- Industry
- IaaS, PaaS, SaaS
- Open Source

Bold, New, Playful, Ground Breaking, Enterprise-Grade
- Open & Collaborative for new App Economy; Research Challenges

Fun, Fast, Bold
- Black with orange accents and racing stripe
- Open Cells Hexagon with Logo mark

Off Cycle / New Cycle (timeless)
- LinuxCon, DockerCon, VMWorld, OSCon, SXSW
- Meetups, Hackathons, Garages

IBM z Systems and Linux ONE
IBM LinuxONE Systems
Two systems to choose from for Linux platform

**Emperor**
With a huge capacity range, grow with virtually limitless scale to handle the most critical and demanding workloads

**Rockhopper**
An entry point model offering all the same value but with the flexibility of a smaller package
Who is using Linux on IBM z

Used in 22 industries in >60 countries around the globe

Most used in:
- Government
- Banking and Financial Markets
- Computer Services
- Insurance and Healthcare
- Retail, Telecommunication, Energy & Utilities, Automation and Education

- Very large installations with up to hundreds of IFLs in USA, Japan, Brazil, Germany, UK and South Africa
- Small installations with 2 IFLs in all countries and on all z Systems models
- Most clients run Linux together with z/OS and/or z/VSE on a z Systems server
Note:
Max. possible power is used in all calculations: hot room, max plugged I/O power, max. memory power and all engines turned on.
Real world max. capacity system is typically about 3/4 of this power.
Highly efficient partitioning guarantees service delivery for all priority workloads

- High priority workloads can run at very high utilization and drive high throughput (2.5k tps)
- No degradation in throughput when low priority workloads are added

On virtualized x86 servers, ‘noisy neighbors’ (low priority workloads) steal valuable resources from high priority workloads

*On LinuxONE, high priority workloads are in partition 1 and low priority workloads are in partition two. On x86 server, all workloads are in the same hypervisor instance.*
IBM z System Resources

IBM z13: Advanced system design

System I/O Bandwidth
832 GB/Sec*

Memory
10 TB

PCI for 1-way
1695

Customer Processors

* No server can fully exploit its maximum I/O bandwidth

PCI – Processor Capacity Index (IBM MIPS)
Capacity on demand on LinuxONE systems - purchase only the capacity desired, add more when needed without service disruption

Purchase desired number of active cores at standard price

Optionally purchase “on demand” inactive cores at reduced price
- Activated as needed with no service disruption
- Self-managed, self-activated
- Use for temporary or permanent capacity (pay by usage)

Example: Sales cycles may demand extra capacity during specific periods
Both x86 and z System chips use state-of-the-art technology

<table>
<thead>
<tr>
<th></th>
<th>Haswell E5 2600 V3 chip</th>
<th>z13 chip</th>
</tr>
</thead>
<tbody>
<tr>
<td>Micro-technology</td>
<td>22 nm SOI</td>
<td>22 nm SOI</td>
</tr>
<tr>
<td>Core count, speed</td>
<td>18 core per socket, 2.3 GHz*</td>
<td>8 core per chip, <strong>5.0 GHz</strong></td>
</tr>
<tr>
<td>Core housing</td>
<td>Sockets – 2 per server (36 max. core)</td>
<td>Drawer – 6 chips per drawer, (1, 2, 3 and 4 drawer models)</td>
</tr>
<tr>
<td># Threads</td>
<td>2 per core</td>
<td>2 per core</td>
</tr>
<tr>
<td>SIMD, out-of-order processing, transactional memory</td>
<td>yes, yes, yes</td>
<td>yes, yes, yes</td>
</tr>
</tbody>
</table>

*zHaswell E5-2699 V3

z13 has fastest commercially available clock speed
LinuxONE Rockhopper is optimized for high-performance

Uses the latest SOI semiconductor technology (22nm)
Up to 20 cores total
• 4.3 GHz clock speed
• 2 threads per core
• 100% Linux
Up to 4 TB memory
3 levels of on-chip cache, plus L4 cache on separate chip
Up to 3 separate cores dedicated to handling I/O exclusively

<table>
<thead>
<tr>
<th>Model</th>
<th>Cores</th>
<th>Max Mem</th>
</tr>
</thead>
<tbody>
<tr>
<td>N10</td>
<td>10</td>
<td>984 GB</td>
</tr>
<tr>
<td>N20 1 Drawer</td>
<td>20</td>
<td>2008 GB</td>
</tr>
<tr>
<td>N20 2 CPC Drawers</td>
<td>20</td>
<td>4056 GB</td>
</tr>
</tbody>
</table>
IBM z13
The mainframe optimized for the digital era

- Performance, scale, intelligent I/O and security enhancements to support transaction growth in the mobile world
- More memory, new cache design, improved I/O bandwidth and compression help to serve up more data for analytics
- Enterprise grade Linux solution, open standards, enhanced sharing and focus on business continuity to support cloud

1 Based on preliminary internal measurements and projections. Official performance data will be available upon announce and can be obtained online at LSPR (Large Systems Performance Reference) website at: https://www-304.ibm.com/servers/resourcelink/lb03060.nsf/pages/lspindex?OpenDocument. Actual performance results may vary by customer based on individual workload, configuration and software levels

* All statements regarding IBM’s future direction and intent are subject to change or withdrawal without notice, and represent goals and objectives only.

IBM z13™ (z13)
Machine Type: 2964
Models:
N30, N63, N96, NC9, NE1

- Single thread capacity improvement over zEC12: 10%
- Total capacity improvement over zEC12: Up to 40%
- 3X more available memory to help z/OS® or Linux® workloads: Up to 10 TB
- zKVM* and GDPS® virtual appliance for Linux on IBM z Systems™ opens the door for more Linux®: Up to 141

Upgradeable from IBM zEnterprise® 196 (z196) and IBM zEnterprise EC12 (zEC12)
LinuxONE Systems are built with highest reliability - redundant parts, eliminating single points of failure

For example: if a core fails, a spare can be “turned on” without system or program interruption

Most LinuxONE systems ship with two extra cores designated as spares*

* In addition, any unused core can act as a spare

Core failover (called sparing) is transparent to applications

Spares need not be local on the same chip or in the same drawer

* Smaller N10 model of LinuxONE Rockhopper does not contain designated spare cores
LinuxONE has a flexible scalable platform – the most secure commercially available

**Firmware-based partitioning**
- Complete workload isolation – EAL 5+

**Resources can be pooled across partitions or dedicated to individual partition**

**Fast communication among partitions**
- via fast, *in-memory* TCP/IP (Hipersockets)

**Run Linux workload directly on partitions or as virtual machines (VMs) under a hypervisor (KVM or z/VM) in a partition**

**Advanced workload management enables maximum utilization of the system**

**Scale out** by adding more Linux VMs and **scale up** by adding resources to existing Linux VMs
- Grow without disruption to running environment
Success Stories
Based on YE 2003 to YE 2015

**Top 100 is based on total installed MIPS**

Installed Linux MIPS at 42% CAGR*

48% of z Systems enterprises have IFL’s installed as of 2Q16

93 of the top 100 z Systems enterprises are running Linux on z as of 2Q16 **

27.7% of Total installed MIPS run Linux as of 2Q16

Installed IFL MIPS increased by 10% YTY from 2Q15 to 2Q16

36% of all z Systems servers have IFLs

- 62% of new FIE/FIC z Systems accounts run Linux

* Based on YE 2003 to YE 2015  **Top 100 is based on total installed MIPS
Dundee City Council Delivers Value Through New Technologies

Creating a cost-effective IT architecture with SUSE Linux Enterprise Server on IBM System z and IBM XIV Storage System technologies

Business need:
Like all UK local authorities, Dundee City Council needs to handle increasing demand for IT and eGovernment services, while also reducing costs in line with central government targets. When the lease on its server and storage hardware needed to be renewed, the Council saw an opportunity to enhance its capabilities and increase value for money.

Solution:
Dundee worked with IBM to upgrade its mainframe environment with two powerful IBM System z10® servers, and introduced the IBM XIV® Storage System to replace a mixed storage environment. The new infrastructure runs a range of Linux applications and Oracle databases – supporting key systems such as social services 24x7.

Benefits:
• Improves performance by more than 50 percent, providing capacity for growth without increasing IT costs.
• Enables very rapid provisioning of virtualised server and storage resources, enabling the IT team to respond more quickly to end users’ needs.
• Provides excellent availability and disaster recovery capabilities: in the event of a disaster at the main site, all systems can be restored at another location within 20 minutes.
• Reduces Oracle licensing costs, as numerous virtual Linux servers can run on each IFL processor.

“Running Linux on the System z platform is a cost-efficient approach, especially for software like Oracle, which is licensed on a per-processor basis. We can run 60 virtual machines on just four System z processors – whereas an equivalent x86-based architecture might require several processors for each server! So the savings can be considerable.”

- Tim Simpson, IT Support Manager, Dundee City Council
ICU IT Services is launching new services on IBM LinuxONE Rockhopper – the first LinuxONE environment to ever go live in the Benelux.

“With SUSE and IBM LinuxONE, we can deliver modern solutions for DevOps, Cloud, Data management and Security using state-of-the-art technology – enabling us to offer solutions with unparalleled speed for large, data-oriented workloads and the highest possible availability requirements.”

– Johan Schelling, Managing Partner at ICU IT Services

Challenge
Help customers explore the many possibilities of enterprise-grade Linux and LinuxONE, and get more out of their IT infrastructure.

Solution
ICU IT Services selected SUSE Linux Enterprise Server for z Systems as its operating system for LinuxONE, with virtualization capabilities delivered by KVM and z/VM hypervisors.

Results
Can easily support between 100 and 200 virtual instances of SUSE across just two CPUs. Adds up to huge savings on data center space, energy, cooling and software costs and management effort.
"We did not have any SUSE Linux Enterprise Server-related problems when we launched the full SOA platform," said Tetsuya Tagami, Manager, Systems Infrastructure Department No. 1, Systems Division, BTMU. "The transition was stable and the OS ran smoothly the entire time, allowing us to focus on developing our business services instead."

SICOOB
Ported their software to SUSE Linux Enterprise Server for IBM System z

Since 2007 Sicoob has more than doubled in size. Kitayama says they are saving around $3 million in energy costs annually, and the upgrade from SUSE 10 to 11 was worth a cool million in increased performance.

https://www.suse.com/success/stories/sicoob
z Systems, LinuxONE and SUSE a successfully partnership
Our 16-year Journey

1999:
- IBM Linux Tech Center
- Linux on S/390

2000:
- First release
  - Linux on S/390
- SUSE Linux
- Integ Facility for Linux (IFL)

2001:
- Red Hat Linux
- HiperSockets™
- 250 Appl. Ported
- SAP, Oracle 9i

2002:
- major ISVs: SAP, Oracle 9i
- Chipshopper

2003:
- DB2 8
- WebSphere®
- 1000 Appl., 300 ISVs

2004:
- 2006: Spectrum Scale™ (GPFS™) for Linux
- 1000 Appl., 300 ISVs

2005:
- 2006: Oracle 10G
- 2007: IBM Big Green
  - Consolidation 3900 to 30
- >3000 Applications
- 2009: z/VM v6
- Enterprise Linux Server

2006:
- 1000 Appl., 300 ISVs
- Chipshopper

2007:
- 2009: z/VM v6
- Enterprise Linux Server
- Spectrum Scale™ (GPFS™) for Linux

2008:
- 2009: z/VM v6
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- Spectrum Scale™ (GPFS™) for Linux
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2009:
- 2009: z/VM v6
- Enterprise Linux Server
- Spectrum Scale™ (GPFS™) for Linux
- >3000 Applications

2010:
- 2010: Oracle 10G
- 2011: Oracle 11G
- 2012: IBM Wave
- OpenStack
- KVM for IBM z
- GDPS® Virt. App.
- Financial Transaction Manager
- Open source ecosystem

2011:
- 2011: IBM Wave
- OpenStack
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2012:
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2013:
- 2013: IBM Wave
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- GDPS® Virt. App.
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2014:
- 2014: IBM Wave
- OpenStack
- KVM for IBM z
- GDPS® Virt. App.
- Financial Transaction Manager
- Open source ecosystem

2015:
- 2015: IBM Wave
- OpenStack
- KVM for IBM z
- GDPS® Virt. App.
- Financial Transaction Manager
- Open source ecosystem

2016:
- 2016: IBM Wave
- OpenStack
- KVM for IBM z
- GDPS® Virt. App.
- Financial Transaction Manager
- Open source ecosystem
50+ years of Mainframe
16+ years of Linux development for IBM z System

Timeline and Milestones
SUSE Linux Enterprise Server for z System and LinuxONE

It seems like just yesterday SUSE Linux Enterprise Server met its first mainframe. From the moment we introduced SUSE Linux Enterprise Server for Systems z almost 15 years ago, our enterprise is helping you embrace an IBM z System. 50+ years of Mainframe and 16+ years of Linux development for IBM z System.

SUSE and IBM have been on a journey of innovation and collaboration for the delivery of the SUSE Linux Enterprise Server for IBM Mainframe and LinuxONE.

SUSE and IBM enter into a formal strategic alliance
2007 - 2008: With massive investments in R&D and marketing, SUSE and IBM quickly announced the SUSE Linux Enterprise Server for IBM z System.

IBM and SUSE enter a formal strategic alliance
1999
2001
2003
2005
2007
2009
2011
2013
2014

SUSE and IBM enter into a formal strategic alliance
2007 - 2008: With massive investments in R&D and marketing, SUSE and IBM quickly announced the SUSE Linux Enterprise Server for IBM z System.

The next generation Linux platform: SUSE Linux Enterprise
2016-2018: The next generation Linux platform: SUSE Linux Enterprise 15 is launched. It supports IBM System z solution stacks and provides a seamless, secure, and efficient experience for IBM System z developers.

SUSE and IBM announce a strategic alliance
2007 - 2008: SUSE and IBM enter into a formal strategic alliance, allowing for better integration of SUSE Linux Enterprise Server for IBM System z.

From the moment we introduced SUSE Linux Enterprise Server for Systems z almost 15 years ago, our enterprise is helping you embrace an IBM z System. It has been remarkable, together with our valued partner IBM, to have identified more Linux-native mainframe innovations than any other vendor did with the traditional, most cost-effective alternative server operating system to IBM. As the only Linux distributor that’s been on the mainframe for more than 15 years, we can safely say that if history were to repeat itself, the future looks even brighter.

WWW.SUSE.COM
Product portfolio
IBM z Systems and IBM LinuxONE have four strategic virtualization platforms

<table>
<thead>
<tr>
<th>Platform</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBM z/VM</td>
<td>z/Proprietary Server Virtualization that is completely integrated into the full stack. Complete hardware awareness. Supported on all IBM z Systems and LinuxONE servers. z/VM will continue to be enhanced to support Linux Workloads.</td>
</tr>
<tr>
<td>KVM for IBM z Systems</td>
<td>KVM for IBM z provides an open source choice for IBM z Systems and LinuxONE virtualization for Linux workloads. Best for clients that are not familiar with z/VM and are Linux centric admins</td>
</tr>
<tr>
<td>IBM Processor Resource/System Manager (PR/SM)</td>
<td>Divide one physical server into up to 85 logical partitions (LPAR) running a mix of multiple z/OS, z/VM, Linux, KVM for IBM z, Transaction Processing Facility (TPF) and z/VSE instances isolated and secured in parallel. Share resources across LPARs or dedicated to a particular LPAR. Running a mix of multiple z/OS, z/VM, Linux, TPF, KVM for IBM z and z/VSE instances isolated and secured in parallel.</td>
</tr>
<tr>
<td>IBM Dynamic Partition Manager (DPM)</td>
<td>DPM is a new administrative mode of PR/SM that simplifies configuration of partitions, associated resources and I/O. It allows partitions to be quickly configured, along with the management of system resources including integrated dynamic I/O management, as easily as other virtualized environments. It was developed for new-to-z users working on servers with KVM on z and/or Linux for z Systems or LinuxONE as a partition-hosted operating system.</td>
</tr>
</tbody>
</table>
**z/VM V6.4**

**Key Efficiency and Scalability Enhancements**

**Paging enhancements (HyperPAV)**
- z/VM V6.4 can exploit IBM DS8000 HyperPAV to increase paging bandwidth, allowing more I/Os in-flight at once
- Exploitation is available for Paging, Spooling, z/VM user directory, and minidisk pools mapped to z/VM data spaces
- This enables a higher level of elasticity, allowing a z/VM system to more easily absorb workload spikes that constrain memory utilization

**Support for up to 2 TB of host (z/VM) real memory**
- Maximum amount of real memory supported by z/VM is increased from 1 TB to 2 TB
- This allows clients to potentially host more and/or larger virtual machine configurations than possible with a 1 TB maximum
- Maximum supported virtual memory for a single guest remains at 1 TB

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**Announce**
October 25, 2016

**GA**
November 11, 2016
# KVM for IBM z Systems

<table>
<thead>
<tr>
<th>Features of KVM for IBM z Systems v1.1.2</th>
<th>Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Simplified installation of guest operating systems</strong></td>
<td>Enhancements to the KVM hypervisor enable the booting of a guest from a virtual CD or DVD to simplify the installation of guest operating systems</td>
</tr>
<tr>
<td><strong>CPU Hotplug</strong></td>
<td>The CPU Hotplug feature allows you to dynamically add virtual CPUs to a running guest. This increases the productivity of a system as it aligns resources to the changing needs of workloads.</td>
</tr>
<tr>
<td><strong>Configuration and management of virtual servers</strong></td>
<td>KVM for IBM z provides users of x86 KVM the same virt-manager application and virt-install tools to configure and manage virtual servers with the tools they already know and use.</td>
</tr>
<tr>
<td><strong>Enhanced installer options</strong></td>
<td>Enhancements include a new web browser-based installer that simplifies the installation of the KVM hypervisor and provides accessibility features. The existing text-based installer is enhanced to include new features like support for additional protocols.</td>
</tr>
<tr>
<td><strong>High availability of critical resources</strong></td>
<td>KVM for z now includes support for Pacemaker and Corosync which helps to ensure high availability of critical resources, especially guests.</td>
</tr>
<tr>
<td><strong>Support for Kimchi</strong></td>
<td>Kimchi is a a tool aimed at simplifying management tasks. New functions include user management, user activity logging, and system module functionalities.</td>
</tr>
<tr>
<td><strong>Management of IBM software licensing entitlements</strong></td>
<td>KVM for IBM z is enabled for the IBM License Metric Tool, which is a no-charge utility that determines processor value unit (PVU) licensing requirements. IBM License Metric Tool helps IBM Passport Advantage customers determine their full and sub-capacity PVU licensing requirements. It helps calculate the number of PVUs available to installed Passport Advantage PVU-based software, including supported virtualized servers.</td>
</tr>
</tbody>
</table>

**Full SUSE SLES support and certification when running on KVM for IBM z starting with SLES 12 SP1**

**History:**

- **January 14/2015:** Statement of Direction
- **August 17/2015:** Announcement
- **September 18/2015:** General Availability KVM 1.1.0
- **March 18 2016:** KVM 1.1.1
- **October 28 2016:** KVM 1.1.2

**Announce**

October 25, 2016

**GA**

October 28, 2016
Virtualization for z Systems

IBM KVM support
- SMT for increased capacity and SIMD to accelerate analytics
- Crypto exploitation to leverage hardware acceleration
- Expose SIE Capability to Userspace to allow 2nd level virtualization
- Bridge Hipersockets to Ethernet, add openvswitch / OSA support
- Guests on CDL formatted ECKD disks
- Shutdown / reboot enhancements with hypervisor interaction

z/VM 6.4 support
- Enables extreme scalability, security, and efficiency
- Improved z/VM SSI integration
- Enable Layer 2 offloads in qeth device driver
- Add VMUR print spool options
- HYPFS: Add Diag 0C support – monitor guest performance from Linux guest
Collaborative Memory Management Assist CMMA

- Extends coordination of memory and paging between Linux and z/VM to the level of individual pages

- z/VM reclaims “unused” pages at higher priority

- Bypass host page writes for unused and “volatile” pages (clean disk cache pages)

- Signal exception if guest references discarded volatile page

- Use Host Page-Management Assist to re-instantiate pages for next use

- z/VM support included since V5.3
Linux Exploitation of z/VM Discontiguous Saved Segments (DCSS)

- DCSS support is data-in-memory technology
  - Share a single, real memory location among multiple virtual machines
  - High-performance data access
  - Can reduce real memory utilization

- Linux exploitation support available today
  - Execute-in-place (xip2) file system
  - DCSS memory locations can reside outside the defined virtual machine configuration
  - Access to file system is at memory speeds; executables are invoked directly out of the file system (no data movement required)
  - Avoids duplication of virtual memory and data stored on disks
  - Enables throughput benefits for Linux guest images and helps enhance overall system performance and scalability
SUSE Manager
Enhance software-defined data center management

Focus areas
- Configuration Management
- Subscription Management
- Expanded Monitoring

Upgrade Compatibility
SUSE Manager Server can be x86-64 and s390x
Extension to SLES12 SP1
Saltstack integration with states
SLE and RHEL client support
Increase Uptime
Share your use case: we are ready for Live Patching

- **SUSE Linux Enterprise Live Patching**
  - Live patching for the kernel is designed and developed by SUSE Labs
  - Ease of use: Builds on well-known update processes

- **Use Cases**
  - Mission-critical systems: Improve general availability and run until the next “maintenance window”
  - Massive, time-critical deployment

- **Advantage**
  - Works with zero execution interruption
  - Other implementation stop the whole system (milliseconds to seconds range) when patching

- Read more at: https://www.suse.com/products/live-patching/
Technology outlook
IBM z Systems: Innovation – Integrated by design

1 Open Source and Linux bring a wealth of new management tools, languages, databases, etc. to z Systems – there are just a few listed on this chart.
Innovation Drives Performance

*Physics is not permitting performance gains by technology scaling; however it is still enabling more transistors on a node to node basis*
IBM is investing $3 billion to push the limits of chip technology

- New materials and devices to extend core logic, memory, & I/O technology roadmaps

- Continue silicon scaling

- New computing devices and architectures

Scaling: 22, 14, 10, 7, 5 nm Nodes
Acceleration & Optimization

- **Embedded accelerators**
  - Computation engines for analytics
  - Assists for dynamic software optimization
  - Enablement for integrated function
  - Close collaboration with compiler and other software teams

- **PCIe-attached accelerators**
  - Leverage flexibility for special functions
  - In-line processing of data entering or leaving system
  - Off-load specialized data processing

- **Heterogeneous system optimization**
  - Integrate special-purpose appliances into z Systems workloads
  - Leverage specialty engines for system scale and price/performance
  - Seamlessly integrate cloud and mobile capabilities with z Systems
SUSE future strategy
Ten ways *SUSE Linux Enterprise for z Systems* Ignites Innovation

**Part of IBM z Systems**, targeting DevOps

**Greenstack** – create agile & trusted cloud infrastructure

**New innovations** for performance, networking, storage, security

**Building a secure operating environment**

**DevOps** – quicker time to value & higher customer satisfaction

**Open Mainframe Project** global community

**Performance and throughput acceleration** by exploiting z Systems

**Operational efficiency** across advanced physical, virtual, cloud workloads

**Package Hub** for pre-built community packages
Security and Certifications for z Systems

FIPS 140-2 Certifications

<table>
<thead>
<tr>
<th>Module Name</th>
<th>Certificate released</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUSE Mozilla-NSS</td>
<td>Certificate released</td>
</tr>
<tr>
<td>StrongSwan Cryptographic Module</td>
<td>Certificate released</td>
</tr>
<tr>
<td>Ibgcrypt Cryptographic Module</td>
<td>Certificate released</td>
</tr>
<tr>
<td>OpenSSH Server Module</td>
<td>Certificate released</td>
</tr>
<tr>
<td>OpenSSH Client Module</td>
<td>Certificate released</td>
</tr>
<tr>
<td>Kernel Crypto API Cryptographic Module version 1.0</td>
<td>Certificate released</td>
</tr>
<tr>
<td>OpenSSL Module</td>
<td>Certificate released</td>
</tr>
</tbody>
</table>

http://csrc.nist.gov/groups/STM/cmvp/documents/140-1/140val-all.htm
SUSE OpenStack Cloud

Build a private cloud enabling IT to quickly respond to changing business requirements by transforming IT using the latest innovations and improving agility

- **Rapid deployment and easy management** to accelerate delivery of real business benefits
- **Robust, production ready cloud platform** for running business-critical workloads
- **Widest hypervisor support and broadest interoperability** to drive down costs and protect existing IT investment
SUSE Portfolio for IBM LinuxONE and z Systems

System Analysis   Machinery   Deployment Management

Image Building  PaaS   Container Management

SUSE Studio   docker   CHEF   SUSE Manager

KIWI   SUSE OpenStack Cloud   ANSIBLE   SALTSTACK

SUSE Linux Enterprise Server

Virtualization Layer

z/VM   KVM for IBM z

Physical Infrastructure

IBM LinuxONE Rockhopper   IBM LinuxONE Emperor

storage   switch
SUSE Package Hub

Broaden the software choices for enterprise users

Open Source Software
For SLES 12

Community built
SUSE approved

25,000+
Upstream Packages

Enterprise User

http://packagehub.suse.com/
Where to start?
Building developer gravity through a growing ecosystem

<table>
<thead>
<tr>
<th>Enterprise Big Data and Analytics</th>
<th>Hybrid Cloud</th>
<th>Enterprise Open Source</th>
<th>Enterprise Open Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Systems of Record</td>
<td>Systems of Insight</td>
<td>Pattern-Enabled Infrastructure as a Service</td>
<td>Linux on z</td>
</tr>
</tbody>
</table>

![Alternating row of logos representing technologies and programming languages.](image-url)
Open Access

IBM LinuxONE COMMUNITY CLOUD

ibm.com/linuxone/try
IBM zPDT

IBM zPDT Version 1.6 is available since April 30th, 2015, from Information Technology Company (ITC)

- Support for z13 EC CPU Architecture - The relevant instruction set for the System z13 EC CPU Architecture is included
- z13 Cryptographic Enhancements - provides Emulated Crypto Express 5S support including new Visa Format Preservation Enhancement (FPE) Support
- z13 EC Coupling - Enhanced Coupling Support
- Support for STP - allowing Basic Sysplex between zPDT HW systems
- Quick video introduction https://youtu.be/tI5jk-1OI-g
Education and Community

EMA, Destination z, zNextGen, SHARE, GSE

Multiple sources and initiatives to grow the worldwide skill sets around the mainframe ecosystem

- [http://mainframe-academy.de/](http://mainframe-academy.de/)
- [http://www.gse.org](http://www.gse.org)
- [http://www.share.org/](http://www.share.org/) → zNextGen
- [http://www.mainframes.com/zacademic.html](http://www.mainframes.com/zacademic.html)

What Happens When an 18 Year Old Buys a Mainframe …

- [https://www.youtube.com/watch?v=45X4VP8CGtk](https://www.youtube.com/watch?v=45X4VP8CGtk)
z Systems – Platform for Digital Transformation

- Holistic Performance
- All About Data
- Flexible Consumption Model
- Ecosystem and Skills
- Security
Submit requirements!

KVM as well as LinuxONE are now part of the "Request for Enhancement (RFE) Community". To submit a requirement open the community start page and then select the "Submit" tab.

Available products:
Linux on System z, IBM LinuxONE, KVM for IBM z Systems, z/VM & IBM Wave

SUSE requirements can be submitted to their sales reps as well as using the "feedback" button at the bottom of the SUSE Linux Enterprise Server for z System and LinxONE web site.

https://linuxmain.blogspot.co.uk/2016/06/how-to-submit-requirements-for-linux.html