How to grow your business with a scalable and secure Linux data server

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Agenda

- IBM and Red Hat Partnership
- z Systems and LinuxONE
- Deep Dive on LinuxONE
- Customer Cases
- LinuxONE Community
More than 15 years of strong partnership between Red Hat and IBM bringing to our mutual customers access to innovation, performance, scalability and stability.

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 Software
“Red Hat Enterprise Linux 7.3 delivers increased application performance and a more secure, reliable and innovative enterprise platform, well-suited for existing mission-critical workloads and emerging technologies like Linux containers and IoT.”

Jim Totton, VP and GM, Platform Business Unit, Red Hat

Red Hat Enterprise Linux for SAP Applications, a variant optimized for running SAP environments, is now supported on IBM z Systems and IBM Power, big endian.
"Red Hat understands the varied IT security needs of these organizations, and Red Hat Enterprise Linux’s FIPS 140-2 and Common Criteria EAL4+ certifications provide continued support of our commitment to deliver a highly-secure operating system for environments that require strictest of protections."

Paul Smith, VP and GM, Public Sector, Red Hat
Red Hat Developer Toolset 6, which helps to streamline application development on Red Hat Enterprise Linux by giving developers access to some of the latest, stable open source C and C++ compilers and complementary development and performance profiling tools. Red Hat Developer Toolset enables developers to compile applications once and deploy across multiple versions of Red Hat Enterprise Linux.

Red Hat Developer Toolset 6 is now also accessible across heterogeneous computing environments, with support for x86 servers as well as IBM architectures with Red Hat Enterprise Linux for Power and Red Hat Enterprise Linux for z Systems.
Extended Life-cycle Support (ELS) is an optional Add-On subscription for certain Red Hat Enterprise Linux subscriptions. Available during the Extended Life Phase for Red Hat Enterprise Linux 5, the ELS Add-On delivers certain critical-impact security fixes and selected urgent priority bug fixes for the last minor release.

"For Red Hat Enterprise Linux 5, the ELS Add-On covers the IBM z Systems (LinuxONE) and the x86 architecture, both 32-bit and 64-bit variants"
IBM z Systems

IBM Wave
A complete management solution for z Systems based virtual server farms.

3270 Terminal
A computer terminal normally used to communicate with IBM mainframes.
IBM LinuxONE Systems

Dynamic Partitioning Manager (DPM)
- Create Partitions
- Modify Resources
- Gain Insights
IBM LinuxONE Systems

Two systems to choose from depending on business needs

- Huge capacity range
- Grow with virtually limitless scale to handle the most demanding workloads

An entry point model offering with similar value but in a flexible smaller package
IBM LinuxONE Emperor

- The World’s fastest processor
- Massive I/O throughput
- Large memory pools with 4 levels of Cache
- IT analytics to avoid future outages
- Unmatched Security: 28x improved performance over standard secure-key technology
- Highest Availability: Designed to provide 100% uptime for decades

6 to 141 LinuxONE Cores
350 to 8,000 Virtual Machines
IBM LinuxONE Rockhopper

- Entry point into LinuxONE family
- All the same capabilities in a smaller package
- 2 to 13 LinuxONE Cores
- 40 to 600 Virtual Machines
Linux Your Way

Distributions
- Red Hat
- SUSE
- Ubuntu

Hypervisors
- KVM
- LPAR

Languages
- Python
- Ruby
- PHP
- R
- ERLANG
- Scala
- Clojure
- JavaScript
- OCaml
- Java

Runtimes
- Node.js
- Docker
- Chef
- Juju
- OpenStack
- VMware vRealize
- UrbanCode
- Puppet

Management
- Cloud Manager
- vRealize

Database
- MariaDB
- MongoDB
- PostgreSQL
- Cassandra
- DB2

Analytics
- Spark
- Hadoop
- InfoSphere BigInsights
- IBM
- Oracle

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LinuxONE Deep Dive
LinuxONE has multi-dimensional growth and scalability options

- Up to 141 cores
- Up to 10 TB memory
- Up to 160 PCIe slots

- Dynamically add cores, memory, I/O adapters, devices and network cards
- Grow horizontally (add Linux guests) and vertically (add to existing Linux guests)
- Grow without disruption to running environment
- Provision for peak utilization, unused resources automatically reallocated after peak

Add more resources to an existing Linux guest...

... or clone more Linux guests with a high degree of resource sharing
In x86 environments, high priority workloads must have dedicated servers…

…to avoid the effects of ‘noisy neighbors’ – causes increased proliferation of x86 servers

High priority online banking workloads driving a total of 9.1M transactions per hour and low priority discretionary workloads driving 2.8M transactions per hour

Virtualized on 3 Intel 40-core servers
(120 cores total - Linux)

32 cores on LinuxONE
LinuxONE is designed for high I/O bandwidth business workloads.

- Up to 141 cores for business logic
- Up to 320 I/O channel processors – each with 2 POWER cores (160 PCIe slots)
- Up to 24 cores dedicated to I/O processing
- 4 I/O channel processors (2 PCIe slots)
- 24 cores for both business and I/O processing

I/O processing offloaded to separate dedicated cores.

- 80x more I/O channel processors than typical x86 servers

Physical channels virtualized for efficient management of shared resource, plus failover recovery.
Highly efficient partitioning guarantees service delivery for all priority workloads

- High priority workloads (blue) can run at very high utilization (hypervisor partition 1)
- No degradation when low priority workloads are added (hypervisor partition 2)

**LinuxONE**

- High priority workloads (blue) run at lower utilization
- Significant degradation when low priority workloads (maroon) added

On virtualized distributed servers, ‘noisy neighbors’ (low priority workloads) steal valuable resources from high priority workloads
If a core fails, a spare can be “turned on” without system or program interruption

- Each LinuxONE server has two cores designated as spare
- Core failover (called sparing) is transparent to applications
- Spares need not be local to the same chip, node or drawer
- Any core can failover to a spare
LinuxONE has platform options, reducing complexity and improving response times

- **HiperSockets**
  - Very fast, very secure in-memory TCP/IP connectivity
  - Low overhead and minimized latency
  - Transparent to applications
Advanced cryptography is handled at multiple levels depending on business requirements

- Each core has its own cryptographic coprocessor
  - Optimized for encryption functions
- Crypto Express5S PCIe card (optional) adds additional crypto capability
  - Elliptic Curve, SHA3, Visa FPE, etc.
- Meets FIPS, ANSI, PKI, and DK standards
The Met Office (UK) consolidated on LinuxONE to reduce software license costs

17 LinuxONE cores
now handle workload
that previously required
204 x86 cores

75% reduction in Oracle licensing costs

Major simplification
of the distributed server landscape achieved

The Met Office was using Oracle-based systems, mostly running on distributed Linux servers, to handle the post-processing of data from its weather supercomputer. By consolidating all of these distributed database systems onto LinuxONE, Oracle licensing costs have been cut by approximately 75%.

"By consolidating distributed commodity servers, you can save a great deal of money."
— Martyn Catlow, portfolio lead for centralised IT infrastructure, the Met Office
LinuxONE Community
IBM LinuxONE COMMUNITY CLOUD
https://developer.ibm.com/linuxone/
The Open Mainframe Project intends to increase collaboration across the mainframe community and to developed shared tool sets and resources. Furthermore, the Project seeks to involve the participation of academic institutions to assist in teaching and educating the mainframe Linux engineers and developers of tomorrow.
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