Breaking the Hardware Commodity Myth

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Is your infrastructure supporting you?
What is Different about an Enterprise Linux Server (ELS)

Virtualization

- **Do more with less**
  - Deploy more servers, more networks, more applications, and more data
  - Achieve nearly 100% utilization of system resources nearly 100% of the time
  - Enjoy the highest levels of resource sharing, I/O bandwidth, and system availability

- **Reduce costs on a bigger scale**
  - Save on software license fees
  - Consume less power and floor space
  - Minimize hardware needed for business continuance and disaster recovery

- **Manage growth and complexity**
  - Exploit extensive facilities for life cycle management: provisioning, monitoring, security, workload mgmt, capacity planning, charge back, patching, backup, recovery, etc.
  - Add hardware resources to an already-running system without disruption
  - Workload deployment on a “scale up” machine means fewer cables, fewer components to impede growth

- **More flexibility, minimize lead time for new projects**
  - Workload deployment to a single ELS offers significant advantages in terms of flexibility
  - Rapid provisioning reduces lead time for new IT projects, helping to increase business agility
System z’s Extreme Virtualization
Built into the architecture not an “add on” feature

IBM System z
- Deploy virtual servers in seconds
- Highly granular resource sharing (<1%)
- Add physical resources without taking system down, scale out to 1000s of virtual servers
- Do more with less: More virtual servers per core, Share more physical resources across servers
- Extensive virtual server life-cycle management
- Hardware-enforced isolation

Distributed Platforms
- Limited per-core virtual server scalability
- Physical server sprawl is needed to scale
- Operational complexity increases as virtual server images grow
- VMWare, Xen, Virtual Iron focus only on x86, not cross platform hardware management.
Built-in Security for Linux Workloads

- Industry’s top-rated EAL5+ security classification* for hardware Logical Partitions
- EAL4+ security classification of virtualization software provide unmatched levels of security and consolidation
- Security-rich holistic design to help protect system from malware, viruses, and insider threats
- Granular access controls integrated across the platform
- Network security features to help address outside threats
- Encryption solutions to help secure data from theft or compromise

The IBM advantage …only ELS servers can boast the combination of EAL5+, an EAL4+ certified hypervisor, FIPS 140-2 Level 4 and related security certifications

* https://www.bsi.bund.de/ContentBSI/EN/Topics/Certification/newcertificates.html
What is Different about an Enterprise Linux Server (ELS)

What ELS hardware can do that x86 cannot

• **ELS hardware IBM System z® is designed to run multiple workloads concurrently**
  - More cache and memory to support shared workloads
  - Dedicated I/O subsystem delivers high bandwidth and achieves high density for workloads with heavy I/O
  - High Performance FICON (zHPF) improves I/O rates and I/O service time
  - Physical I/O adapters and channel are virtualized and shared by workloads
  - Dynamic channel path management (DCM) dynamically adjust the channel configuration in response to shifting workload patterns

• **ELS hardware has unique workload management capabilities**
  - Workload managers efficiently manages dynamically computing resources
  - Workload manager takes processing resources from “donor” workloads when needed
  - Workload management handles workload peaks with maximum core efficiency
  - LPAR isolation/virtualization permits most effective use of resources
  - Sharing resources efficiently with isolation allows multiple environments to co-exist

• **ELS hardware qualities of service are superior to typical x86 solutions**
  - Comprehensive, multi-layered strategy for reliability and serviceability
  - Concurrent operations with hardware repair and upgrade protects against outages
  - Highest availability and lowest downtime
  - Capacity on Demand provides elasticity to handle unexpected peaks
  - Highest standard for Disaster Recovery
  - Ultimate security – EAL5, virtual machine cannot circumvent workload isolation, HiperSockets™ provide secure memory-speed communication
What is Different about an Enterprise Linux Server (ELS)

Examples: Software Costs and Disaster Recovery

Oracle software is often priced by the number of processor cores. On ELS, one processor is equivalent to one core!

Coordinated near-continuous availability and DR solution for Oracle DBs on Linux
## Software Cost Calculation Example

<table>
<thead>
<tr>
<th></th>
<th>Example 1: From 48* cores to 4</th>
<th>Example 2: From 272* cores to 20</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Before:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SW license</td>
<td>24 * $40K = $960K</td>
<td>136 * $40K = $5,440K</td>
</tr>
<tr>
<td>Support per year</td>
<td>24 * $10K = $240K</td>
<td>136 * $10K = $1,360K</td>
</tr>
<tr>
<td><strong>After:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SW license</td>
<td>0 * $40K = $0K</td>
<td>10 * $40K = $400K</td>
</tr>
<tr>
<td>Support per year</td>
<td>4 * $10K = $40K</td>
<td>20 * $10K = $200K</td>
</tr>
<tr>
<td><strong>1. Year</strong></td>
<td>$200 K savings</td>
<td>$760 K savings</td>
</tr>
<tr>
<td><strong>2. Year</strong></td>
<td>$200 K savings</td>
<td>$1,160 K savings</td>
</tr>
<tr>
<td><strong>3. Year</strong></td>
<td>$200 K savings</td>
<td>$1,160 K savings</td>
</tr>
<tr>
<td><strong>Total for 3 Years</strong></td>
<td>$600 K savings</td>
<td>$3,080 K savings</td>
</tr>
</tbody>
</table>

* Software cost for these server cores is set to 50% of full price.

**NOTE:** IBM does not provide any ISV software prices, the prices in this example do not reflect any real prices.
What is Different about an Enterprise Linux Server (ELS)

Maximizing Resource Utilization

- **Software hypervisor tightly integrated with hardware**
  - Sharing of CPU, memory and I/O resources
  - Virtual network – virtual switches/routers
  - Virtual I/O (mini-disks, virtual cache, …)

- **Shared everything infrastructure through hardware allows for maximum utilization of resources**
  - Processors, Memory, Network, Adapters, Cryptography, Devices

- **Designed to support diverse mixed workloads – not just more of the same**
  - Intelligent and autonomic management of diverse workloads and system resources based on business policies and workload performance objectives
  - Allows deployment while maintaining one virtual server per application
  - Complete workload isolation
  - High speed inter-server connectivity

- **Handles peak workload utilization of 100% without service level degradation**
  - Utilization often (usually?) exceeds 90%
Enterprise Linux Server (ELS)

**Large highly-scalable enterprise class server** running Linux

alias

- Linux on System z server
- Solution Edition for Linux on System z
- zEnterprise and Linux on System z
- Linux on a highly virtualized server based on System z architecture
- Linux on the mainframe

*zEnterprise EC12*  
*zEnterprise 114*
What is Different about an Enterprise Linux Server

**Improved IT Efficiency and Reduced Costs**

- Software acquisition and licensing cost reduction
- Operational and management reduction
- Floor-space and energy reduction
- Network reduction
- Maximizing utilization
- Technology refresh effort reduction
- Growth inside a server
- Disaster recovery cost reduction
- Improving security
What is Different about an Enterprise Linux Server

Saving Money and Reducing Complexity

European Retailer moved Oracle database from 14 Sun servers to ELS
Other Client Examples

- **Eurocontrol MUAC** (Netherlands, Travel & Transportation)
  - Migrated critical applications to a private cloud based on the IBM zEnterprise 196 and integrated IBM BladeCenter servers – ensuring high availability for business support applications. *Shrunk datacenter footprint by 80%, reduced energy consumption by 58%, cut administrative workload by 50%.*

- **Dundee City Council** (UK, Government)
  - For several years, the council has run all its core IT systems (mostly Oracle databases and applications) on ELS servers. "Running Linux on the ELS 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 ELS 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

- **Bank of New Zealand** (New Zealand, Banking)
  - Benefits: The bank has **consolidated 131 SUN SPARC** systems. Recovered 30 percent of datacenter floor space, reduced power consumption by 38 percent, 20 percent return on investment (ROI) over the life of the platform, simplified IT environment - more efficient deployment

- **Business Connexion** (South Africa, IT Services)
  - Approximately **50 virtual machines** across the two ELS servers—a mixture of database servers, application servers and proxy servers for several different hosted clients. “Based on the utilisation of database servers on the mainframe, we calculated that the production environment **equates to about 36 Intel-based** servers.” Created a flexible environment for hosted services, delivered high performance for Oracle databases, enabled competitive pricing for client services.
More Information

Linux on IBM System z:

ibm.com/systems/z/os/linux/
Questions?
Backup - Economics
The economics of the Enterprise Linux Server

- Consolidate an average of 30 server cores (Sandy Bridge) on four ELS cores (3.8 GHz).
- Deliver a virtual Linux server for approximately $500 per year or as little as a $1.45 per day per virtual server (TCA)\(^1\).

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**Oracle Database workload example**

**ELS versus x86:**

Lower acquisition costs of hardware and software vs. x86 servers up to 17% less than Sandy Bridge\(^1\)

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\(^1\) Based on US Enterprise Linux Server pricing. Pricing may vary by country. Model configuration included 10 cores running a mixed workload averaging 31 virtual machines per core with varying degrees of activity. Includes ELS hardware and virtualization software. Does not include Linux OS or middleware software.
The Economics of the ELS for Oracle Deployment and Cost Reduction

- Consolidate an average of 30 distributed servers or more on a single core, or hundreds in a single footprint.
- Deliver a virtual Linux server for approximately $500 per year or as little as a $1.45 per day per virtual server (TCA)¹

TCA Analysis:
Consolidate 40 Oracle server cores onto 3 Linux cores on ELS

Lower acquisition costs of hardware and software vs. distributed servers

– up to 51% less than Nehalem² in new footprint (ELS) –

Plus, additional savings in DR, floor space, power, cooling and labor costs

¹ Based on US Enterprise Linux Server pricing. Pricing may vary by country. Model configuration included 10 cores running a mixed workload averaging 31 virtual machines per core with varying degrees of activity. Includes ELS hardware and virtualization software. Does not include Linux OS or middleware software.

² Distributed server comparison is based on IBM cost modeling of Linux on ELS vs. alternative distributed servers. Given there are multiple factors in this analysis such as utilization rates, application type, local pricing, etc., savings may vary by user.
The Components of an Enterprise Linux Server

An Enterprise Linux Server includes IBM System z hardware, hardware maintenance, IBM virtualization software components and software support & subscription.

• **Hardware options:**
  - IBM zEnterprise® EC12 (zEC12): from 6 cores up to 101 cores running at 5.5 GHz, or IBM zEnterprise 196 (z196): from 6 cores up to 80 cores running at 5.2 GHz, or IBM zEnterprise 114 (z114): from 2 cores up to 10 cores running at 3.8 GHz
  - 32 GB memory per core\(^1\) (except in cases where the configuration increment rules don't support)
  - 24 FICON® ports with zEC12 and z196, 8 FICON ports with z114
  - 8 OSA ports
  - 3-5 years maintenance for all hardware components (1 year warranty and 2 years pre-paid).
  - Additional hardware components can be included optionally with all options.

• **Virtualization software:**
  - z/VM® Version 6 or z/VM Version 5
  - z/VM features: z/VM Directory Maintenance Facility, z/VM Resource Access Control Facility, z/VM Performance Toolkit for VM™, z/VM RSCS Feature
  - 3-5 years Subscription and Support (S&S)
  - Additional IBM software can be included optionally.

**Linux is not included.** Linux can be ordered from the Linux distributors Red Hat or SUSE. Both Linux distribution partners provide offerings for the Enterprise Linux Server.

\(^1\) 24 GB memory per core up to 5 Linux engines
Backup – Workload examples
Recommended workloads for an Enterprise Linux Server

- **Data services**: Cognos®, SPSS®, DB2®, InfoSphere™, Informix®, Oracle Database, Builders WebFOCUS, …

- **Business applications**: WebSphere Application Server, WebSphere Process Server, WebSphere Commerce, …

- **Development & test**: e.g. of WebSphere®/Java applications – Rational® Asset Manager, Build Forge®, ClearCase®, Quality Manager

- **Email & collaboration**: Lotus® Domino®, Lotus Collaboration (Sametime, Connections, Quickr™, Forms) WebSphere Portal, …

- **Enterprise Content Management**: FileNet® Content Manager, Content Manager, Content Manager On Demand


- **Infrastructure services**: WebSphere MQSeries®, WebSphere Message Broker, WebSphere Enterprise Service Bus, DB2 Connect™, FTP, NFS, DNS, Firewall, Proxy, …

- **Cloud management**: Infrastructure (IaaS), Platform (PaaS), Software (SaaS), Business Process as a Service – Tivoli® System Automation Manager, Tivoli Provisioning Manager, Integrated Service Management for System z, Maximo® Asset Management, …
Leverage Proximity of Data and Applications
Get Benefits of Existing and New Applications and Data

Proximity of existing & new applications / data on the same physical Enterprise Linux Server allows to „Get the Best from Your Investements“

- Access from All applications to All data
- Centralized management
- High performance
- High security
Deploy Oracle Software to the “Best Fit” Technology

Oracle software deployments (incl. consolidations) with an Enterprise Linux Server (ELS) provides an excellent price performance.

- From an Oracle licensing perspective 1 ELS core = 1 core from distributed server
- Less operational efforts
- High levels of security and availability

Business Connexion – South Africa

- ICT services to the financial sector, government, … and more
- Approximately 50 virtual Linux servers; flexible environment for hosted services; high performance for Oracle databases
- Enabled competitive pricing for client services

Sporada Datenverarbeitung eG – Germany

- IT provider for approximately 4.2 million customers
- Runs a number of very large Oracle databases, where the virtual Linux server requires 30 GB memory and ~350 GB storage
- Experienced >99% availability, which proves the Linux reputation
Business Intelligence and Predictive Analytics

*IBM Cognos BI and SPSS*

**Integrated Stack creates compelling value for the Business Users**
- Makes Predictive Analytics accessible to the Business User
- Cognos node: Outcome of Predictive Analytics accessed through Cognos reports, KPI, Dashboards

**Integrated stack creates compelling value for IT**
- Predictive Analytics, BI, DW on highly scalable, secure and available IBM Enterprise Linux Server
- Low cost, easy to manage

**Integrated technology stack maximizes performance, regulatory compliance and lowers costs**
- No need to move data to a different platform
- No need to manage a different platform
ISV Ecosystem

- Over 370 new or upgraded Linux applications
- More than 3,000 total Linux applications

Find ISV software available for the Enterprise Linux Server:
http://www.ibm.com/partnerworld/gsd/homepage.do