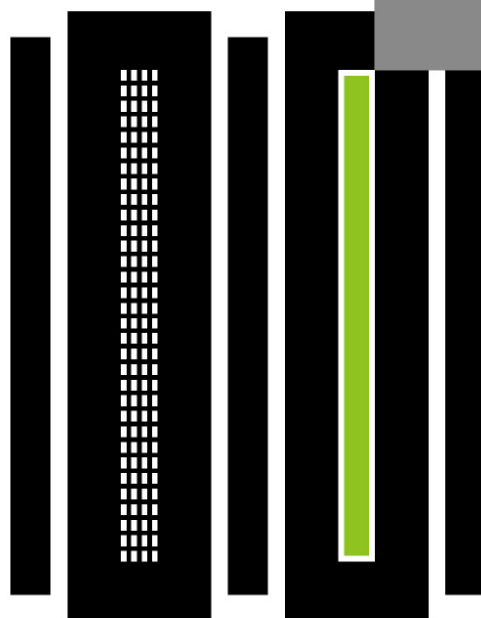


分析为道 **Z** 者见智

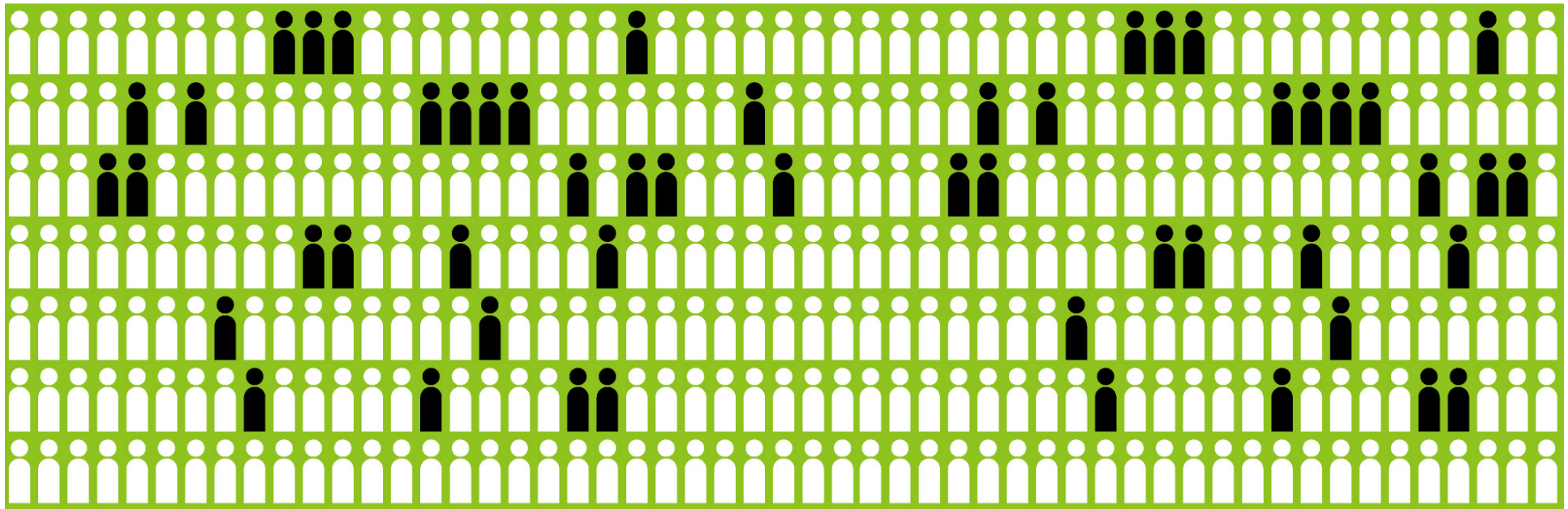
IBM主机商业分析(BA)高峰论坛



Linux on IBM System z

Adam Jollans

Program Director, Linux Strategy, IBM

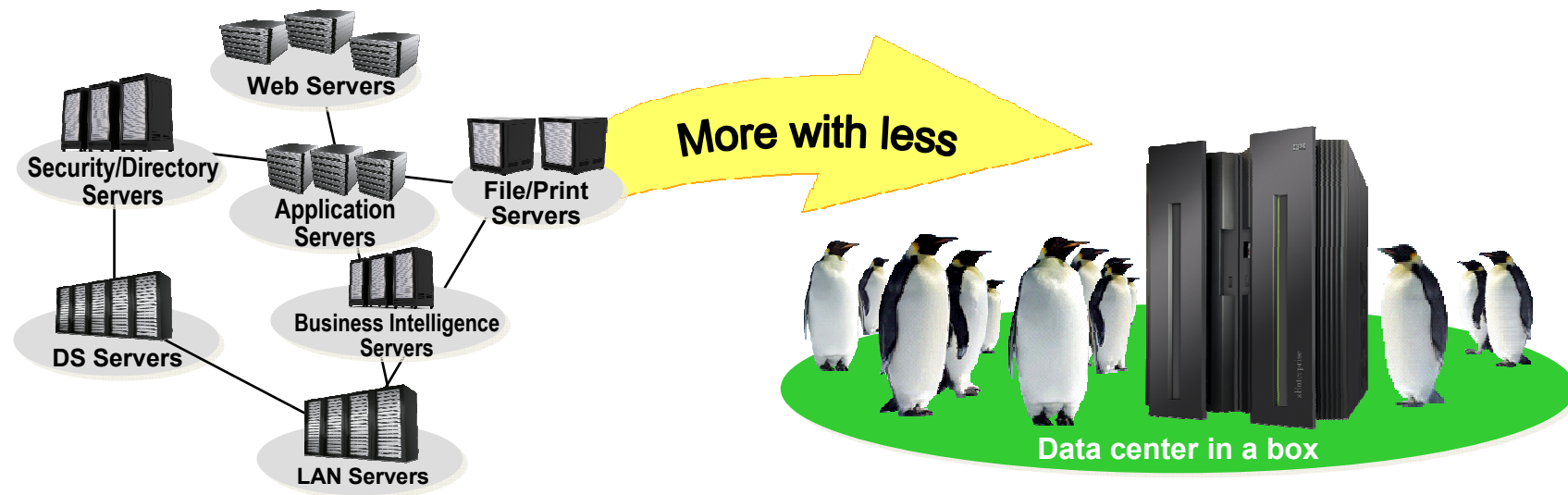


Linux on IBM System z

- Virtualization and Consolidation with Linux and System z
- IBM and Linux
- Linux on System z as a platform for Business Analytics



Virtualization and Consolidation



Islands of computing

- Silo managed islands
- Minimal resource sharing
- Less dynamic

Linux® on IBM zEnterprise™ 196 (z196)

- Single server simplicity
- Industry leading virtualization
- Advanced resource sharing & dynamic allocation

Save money, reduce complexity, improve service

What is Linux on System z ?

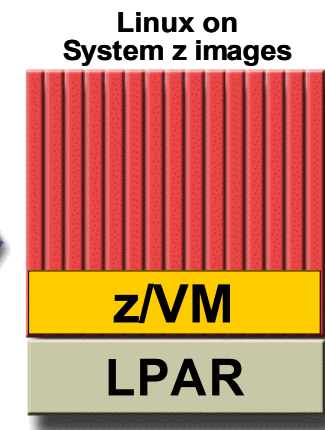
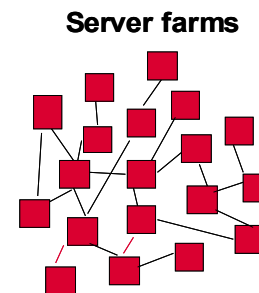
- Port of the open source GNU/Linux operating system to the System z architecture
- Pure Linux – it's an ASCII environment like other versions of Linux
- Natively exploits IBM System z hardware – no emulation
- Runs native, in an LPAR or virtualized under z/VM
- Design Principles of Linux on System z:
 - Not a unique version of Linux (no changes to the standard kernel)
 - No changes regarding look and feel
 - Not a replacement for other IBM server operating systems



Virtualization on System z



- Massive consolidation platform
 - 100s to 1000s of virtual servers under z/VM
 - Virtualization is built-in, not added-on (Hardware support is decades ahead)
 - Sharing of CPU, memory and I/O resources
 - Virtual I/O (mini-disks, virtual cache, guest LAN, ...)
- Intelligent and autonomic management of diverse workloads and system resources
 - Rapid install of new servers
- Utilization often exceeds 90%
 - Handles peak workload utilization of 100% without service level degradation



What does System z bring to Linux

- The most reliable hardware platform available (RAS)
 - Redundant processors and memory
 - Error detection and correction
 - Remote Support Facility (RSF)
- Designed to support mixed work loads
 - Consolidation while maintaining one server per application
 - Complete work load isolation
- High speed inter-server connectivity
- Access to System z specific hardware
 - Crypto support (via crypto library)
 - Traditional and Open I/O subsystems
- Scalability
 - 100s of Linux virtual servers via z/VM
- Security
 - Crypto hardware
- Simplified management of centralized Linux systems





Nationwide®
On Your Side™

*Using virtualization as
a foundation for
innovation*

Business need:

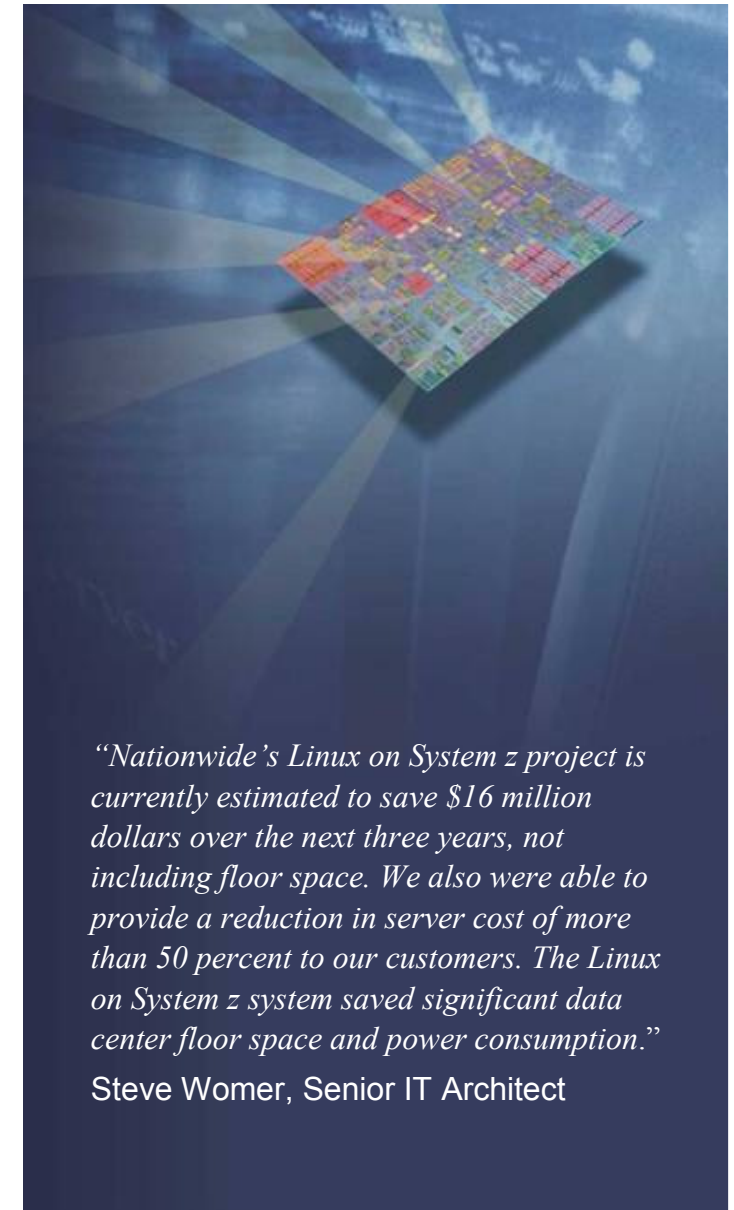
Faced with the need to build a new, multimillion-dollar data center to cope with server proliferation and seeking to streamline application development and daily operations overall, Nationwide Insurance instead made a strategic decision to move to a flexible, virtualized IT environment.

Solution:

Nationwide deployed two IBM System z mainframes running Linux. The solution is a cornerstone of Nationwide's strategy of moving all new development to virtualization and J2EE as a means of "future-proofing" its IT environment.

Benefits:

- Anticipated cost savings of US \$15 million over three years
- Enables server utilization of 85-90 percent
- Reduces environmental costs by 80 percent
- Lowers Web hosting costs by 50 percent
- Leverages investments by using development/testing hardware for business continuity
- Simplifies and speeds server provisioning, enabling developers to try out new ideas quickly



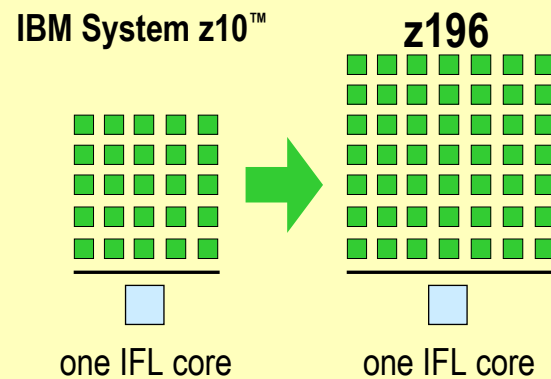
"Nationwide's Linux on System z project is currently estimated to save \$16 million dollars over the next three years, not including floor space. We also were able to provide a reduction in server cost of more than 50 percent to our customers. The Linux on System z system saved significant data center floor space and power consumption."

Steve Womer, Senior IT Architect

Consolidate More and Spend Less with Linux on

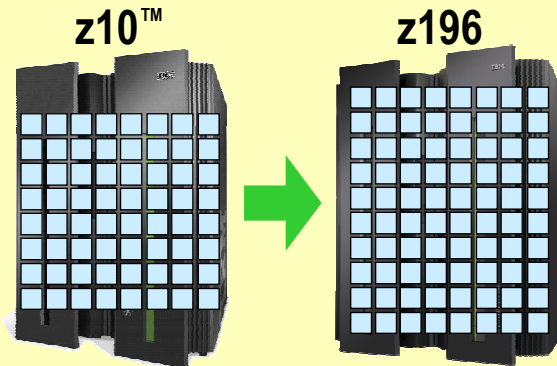
z196

Run more **virtual Linux servers** per core

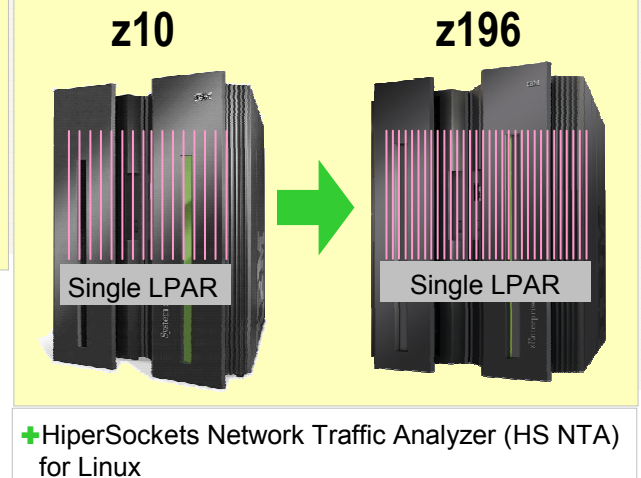


*z196 delivers greater levels of server consolidation **density** and **scalability** with Linux and z/VM® that sets a new standard for TCO and service management.*

Configure more **cores per System**



Configure more **internal networks per System**



- Spend even less on software
- Increase staff productivity even more
- Save even more on floor space and energy costs

z196 - increasing the economic appeal of server consolidation and IT optimization with Linux on z/VM

Why consolidate with Linux and System z ?

▪ Do more with less

- Consolidate more servers, more networks, more applications, and more data than any other platform
- Achieve nearly 100% utilization of system resources nearly 100% of the time
- Enjoy the highest levels of resource sharing, I/O bandwidth, system availability, and staff productivity

▪ Reduce costs on a bigger scale

- Consolidation density saves on power and floor space
- Extreme over-commitment of system resources saves on software license fees *and* helps absorb workload spikes
- Minimize hardware needed for business continuance and disaster recovery (e.g., CBU processors)

▪ Manage growth and complexity

- Exploit extensive z/VM facilities for life cycle management: *provisioning, monitoring, workload mgmt, capacity planning, security, charge back, patching, backup, recovery, more...*
- Add hardware resources to an already-running system without disruption – the epitome of Dynamic Infrastructure
- Co-residency with z/OS (leveraging HyperSockets for network-intensive applications)



Linux on IBM System z

- Virtualization and Consolidation with Linux and System z
- IBM and Linux
- Linux on System z as a platform for Business Analytics



Linux is a core component of the datacenter

Linux continues to enable new ways of doing business



Edge and Web Infrastructure

Characteristics:

- Community Driven
- Internet Enabled
- Worldwide Volunteers

Typical applications:

- E-mail Servers
- Apache, DNS, DHCP
- Lightweight database
- Network infrastructure

Application and Data Serving

Characteristics:

- Open Industry Driven
- Open elements of IT industry join existing community
- Linux adoption in the enterprise accelerates

Typical applications:

- e-Business, Web 2.0
- Application servers
- Broad HPC adoption
- UNIX alternative

Business-Critical Workloads

Characteristics:

- Competition driven
- Accepted as mature, open, lower-cost platform for DB, BI, ERP, CRM
- Cornerstone of datacenter strategies
- Steady adoption through downturn

Typical applications:

- Virtualization
- Consolidation
- Social networking
- Embedded devices
- Real-time

Next Generation Workloads

Characteristics:

- Accelerated adoption post-downturn
- Workload allocation by platform capability
- Utility billing models
- Flexible resource allocation
- IT-led cloud adoption
- Fully established for business-critical use

Typical applications:

- Virtualization / Cloud
- Consolidation
- Analytics, BI, and HPC
- Embedded devices
- DB, ERP, CRM
- Next-gen workloads

1991 – 2004

2005 – 2006

2007 – 2009

2010+

IBM is fully committed to Linux

- IBM has been an active Linux community member since 1999
- IBM is the leading systems vendor contributing to Linux
- IBM has over 600 full-time developers working with Linux and open source

Linux Kernel & Subsystem Development

Kernel Base Architecture Support
GNU
Security
Systems Management
RAS
Virtualization
Special Projects
Filesystems, and more...

Expanding the Open Source Ecosystem

Apache & Apache Projects
Eclipse
Mozilla Firefox
OpenOffice.org
PHP
Samba, and more...



Promoting Open Standards & Community Collaboration

The Linux Foundation
Linux Standards Base
Common Criteria certification
Open Software Initiative, and more...

Foster and Protect the Ecosystem

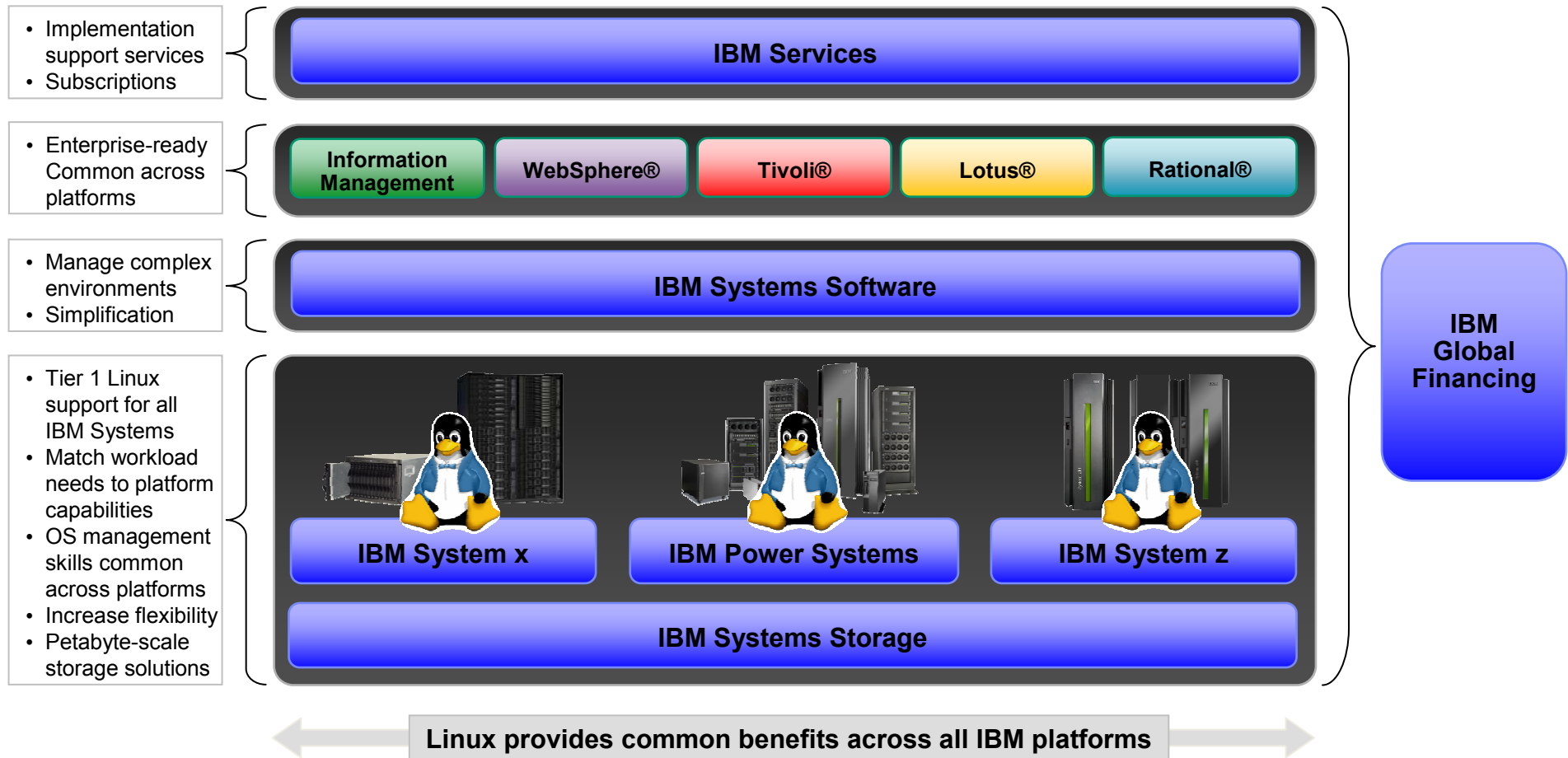
Software Freedom Law Center
Free Software Foundation (FSF)
Open Invention Network, and more...

Who Has Contributed to Linux? (2005 – 2009)

Company Name	Number of Changes	Percent of Total
None	26,644	18.2%
Red Hat	17,981	12.3%
Unknown	11,164	7.6%
IBM	11,151	7.6%
Novell	11,046	7.6%
Intel	7,782	5.3%
Consultant	3,657	2.5%
Oracle	3,513	2.4%
Linux Foundation	2,345	1.6%
SGI	2,317	1.6%
Parallels	1,939	1.3%
Renesas Technology	1,925	1.3%
Academia	1,712	1.2%
Fujitsu	1,592	1.1%
MontaVista	1,564	1.1%
MIPS Technologies	1,537	1.1%
Analog Devices	1,467	1.0%
HP	1,415	1.0%
Freescall	1,375	0.9%
Google	1,261	0.9%

<http://www.linuxfoundation.org/publications/whowriteslinux.pdf>

IBM offers complete Linux solutions



Security

- Policy-based security
- Common criteria certification
- Very rapid time to fix if vulnerabilities are discovered

Supported platforms

- Wristwatches to mainframes
- Broadest range of supported virtualization environments
- Can optimize by workload

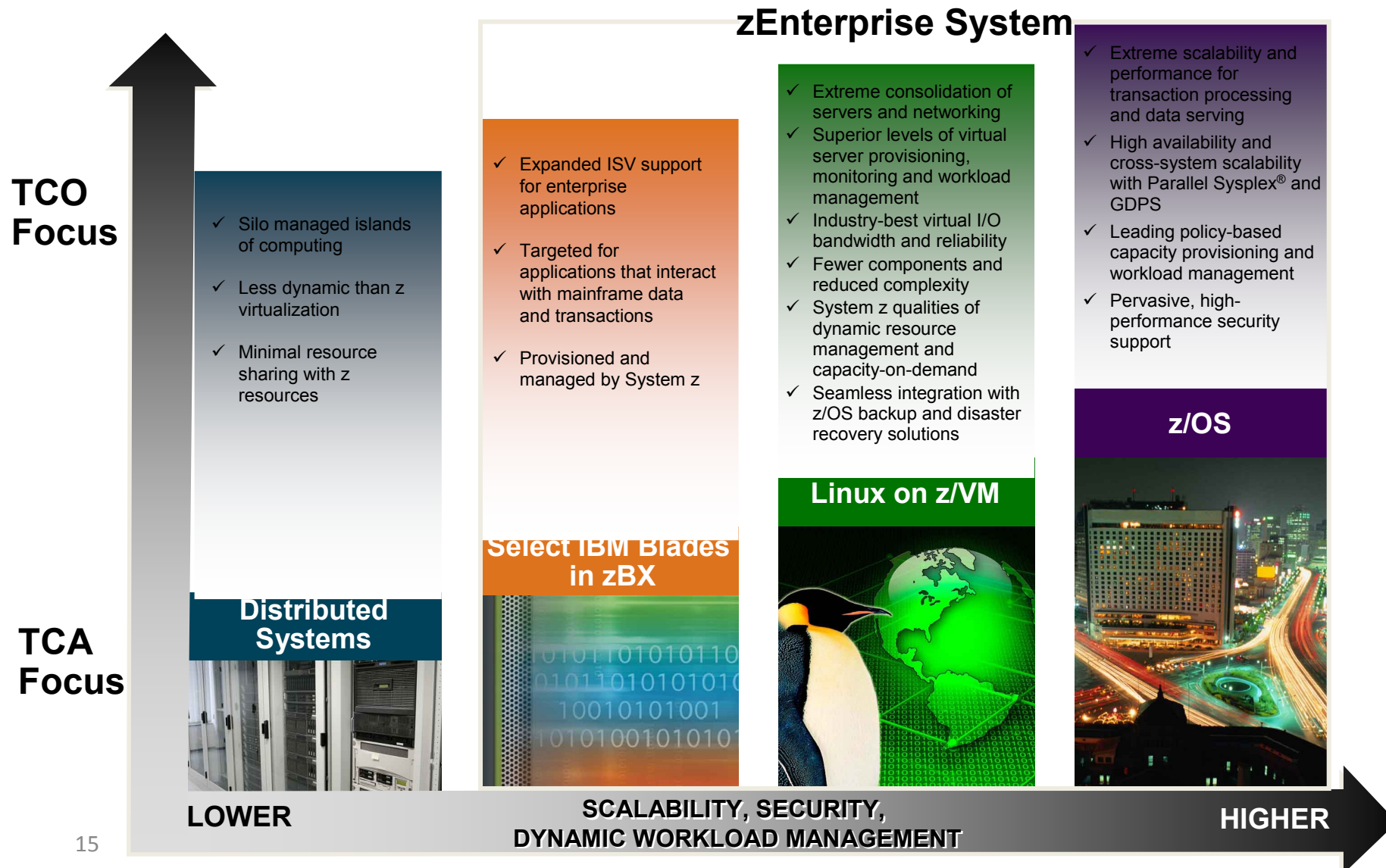
Scalability

- Ongoing innovation in both scale out and scale up
- Platform support provides flexibility in consolidation

Skills

- Linux skills widespread
- OS management skills applicable across platforms

Role of Linux and System z



Bank of New Zealand

Business need:

Address environmental and space issues in the datacentre and achieve the corporate goal of becoming carbon neutral by 2010.
Migration Path: From distributed Intel and SUN SPARC servers to Red Hat Enterprise Linux 5 running under z/VM on IBM z9 and z10 mainframes

Solution:

Software: Red Hat Enterprise Linux 5, Red Hat Network (RHN) Satellite, Oracle database, WebSphere Application Server, ESB, Process Server, TX and MQ
Hardware: 1x IBM z9 and 1x IBM z10 mainframe (with 3 x IFL engines in each)

Benefits:

- 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, more efficient deployment

“The choice to invest in Red Hat was largely based on its commitment to the ongoing development of the platform and its strong support capabilities, particularly in reference to supporting Red Hat Enterprise Linux on the mainframe,”

- Lyle Johnston, infrastructure architect at BNZ

Linux on IBM System z

- Virtualization and Consolidation with Linux and System z
- IBM and Linux
- Linux on System z as a platform for Business Analytics



IBM's strategic Linux focus areas

Linux for Virtualization, Consolidation, and Cloud

Key drivers

- Need to manage sprawl
- Heterogeneous environments drive complexity
- Workload flexibility is crucial

Linux for Data-Intensive Workloads

Key drivers

- Rapidly increasing volumes of data to analyze
- Need for throughput, predictability, and availability

Linux for the Enterprise Desktop

Key drivers

- Need for cost reduction, but increased productivity
- Usage paradigms outgrowing one-size-fits-all approach

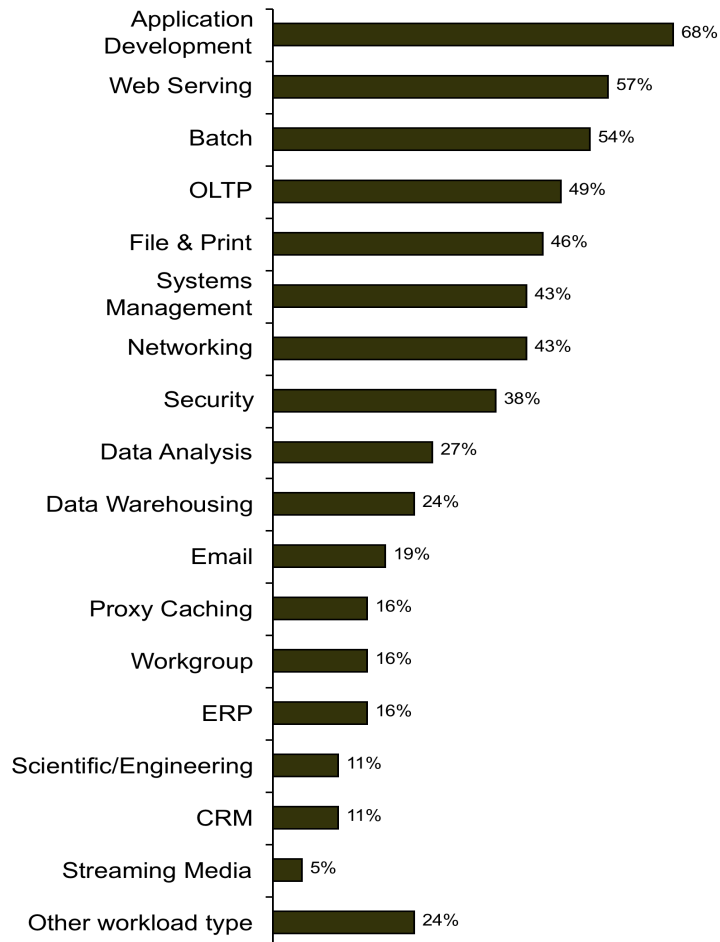
Linux for the Mid-market

Key drivers

- Constraints on business owners' time and budgets
- Must balance IT for growth without breaking the bank



What are Linux Users running on System z?



Surveys indicate customers use:

- Web Serving
- Data Services
- Web Application Serving
- Systems Development

Best Fit Workloads for Linux on System z:

- **Web Application Servers:** WebSphere® Application Server
- **Email and collaboration:** Domino®, Web 2.0
- **Data services:** Cognos®, DB2®, Oracle, Informix®, Information Server, Information Builders WebFOCUS
- **Business critical ISV applications:** e.g., SAP
- **Development of WebSphere and Java applications**
- **Virtualization and security services**
- **Business connectors:** WebSphere MQSeries®, DB2 Connect™, CICS Transaction Gateway, IMS™ Connect for Java
- **Network Infrastructure:** FTP, NFS, DNS, etc., and Communications Server and Communications Controller for Linux, CommuniGate Pro (VoIP)
- **Applications requiring top end disaster recovery model**

Why Business Analytics on Linux and System z ?

- Reduce the cost and complexity in IT infrastructure
 - Consolidation efforts to System z expand application scope from transactional to business analytics
- Leverage the investment in System z
 - Requirements for Business Analytics align to System z Platform: 24x7 availability, scale users and data
 - New technology and price points make Linux and System z cost-effective options
- Easier access to data when locating Business Analytics on the same platform as the transactional data
 - Eliminate potential latency, reduce redundancy and complexity by locating Business Analytics solution near the source of data

IBM Builds Massive Business Analytics Cloud for 200,000 Employees and Unveils Version for Clients



ARMONK, N.Y. - 16 Nov 2009: IBM (NYSE: [IBM](#)) today announced the world's largest private cloud computing environment for business analytics, which will provide IBM sales teams and developers new levels of insight to better meet the needs of clients worldwide. The cloud will launch initially with more than a petabyte of data, the equivalent of more than 300 billion ATM transactions. IBM also announced a new solution, the IBM Smart Analytics Cloud, for clients to build their own private cloud environments based on the same Cloud infrastructure that IBM is using internally.

IBM's Internal Business Analytics Cloud

Internally called Blue Insight, IBM's cloud environment democratizes information, providing access to a variety of client and market data regardless of where an employee sits in the company. It gathers information from nearly 100 different information warehouses and data stores, providing analytics on more than a petabyte (1,000 terabytes or 1,000,000 gigabytes) of data. By turning that data into insight for IBM's sales force and development communities, IBM will be able to deliver more value in the solutions and services it offers to its clients. More than 200,000 IBMers will have access to the new system.

ibm.com/press/us/en/pressrelease/28823.wss

ZSP03160-USEN_07

Linux on IBM System z

adam_jollans@uk.ibm.com

