Controlling Costs through Server Consolidation: CA Linux on System z Strategy Update

John Klonaris, VP Product Management, Linux on System z and z/VM Solutions

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agenda

- Why Linux on System z?
- CA Management for Linux on System z
  - **CA VM:Manager™ Suite** to optimize z/VM virtual environment
  - **Velocity zVPS™ Performance Suite** to manage performance and capacity planning
  - **UPSTREAM for Linux on System z** to backup and restore data
  - Other CA solutions for Linux on System z
- CA Linux on System z Vision and Strategy
  - Automated provisioning for hybrid cloud environment
- Q&A

why Linux on System z?

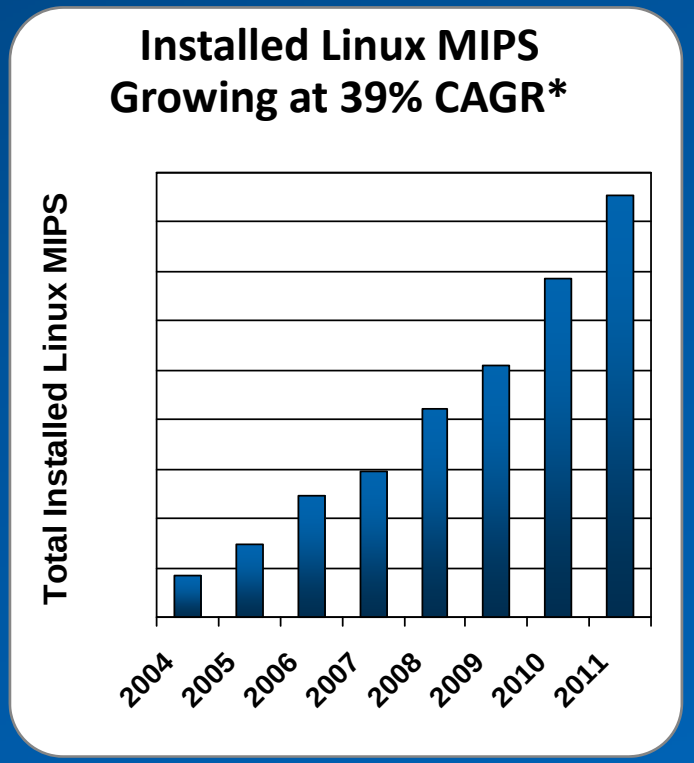
Linux on System z is energy efficient technology

- Reduce energy consumption and save floor space
- Increase utilization and operations efficiency
- Reduce staffing resources required
- STOP Server Sprawl

- Economics of IFLs and z/VM® help drive down cost of IT
  - Perpetual license, separate from MIPS calculation
  - Consolidate from distributed environments to Linux on System z to reduce server sprawl and simplify operations

Linux on System z – a growing market

- 35% of IBM System z customers run Linux on System z (includes 63 of top 100)
- IBM shipped approximately 2,000 Integrated Facility for Linux (IFL) specialty engines in 2010
- Installed IFL MIPS increased 24% in 2011
- 20% of System z MIPS are deployed to support Linux
- Over 3,000 applications are available for Linux on System z



Source: *IBM, April 2012*

national insurance company saves money with Linux on System z

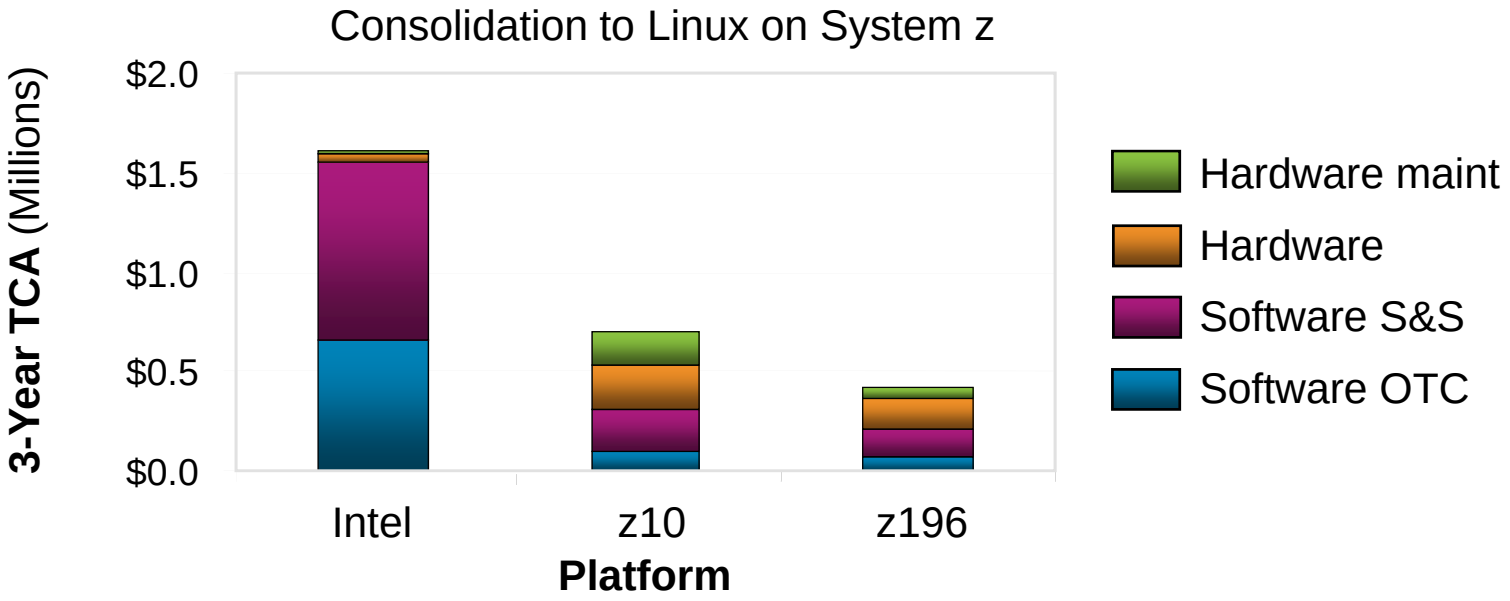
- Business Challenge
  - Pressure from IT growth forced IT investment priorities
  - What started as consolidation project, created unexpected energy savings bonus
- Solution
  - Used Linux on System z and z/VM virtualization to significantly consolidate servers
- Benefits
  - Saved $15 million dollars over 3 years
  - Software costs went down from $3M to $500K
    - Lower middleware costs (DB2, WebSphere)
  - Production: 36 IFLs / 216 Linux servers / 974 apps
  - Development: 21 IFLs / 451 Linux servers / 2,072 apps
  - Lower power and floor space by 80% over alternatives
  - Additional infrastructure savings related to networks, cables, racks, etc.
  - 50% reduction in monthly charges for Web infrastructure
  - Dramatically improved server provisioning speed
  - Able to add workloads without additional FTEs

- Saved $15M over three years
- Lowered power and floor space by 80%
- 36 IFLs for production environment
- 21 IFLs for development environment
- 50% reduction in Web infrastructure charges
- Dramatically improved server provisioning speed

Linux on System z
most efficient platform for large scale consolidation

- Lower acquisition costs of hardware and software vs. distributed servers*
- Less than **$1.00/day** per virtual server (TCA)*
- Reduce floor space by up to **90%** compared to distributed servers*
- Reduce energy consumption by up to **80%** compared to distributed servers*

Example: Consolidate 40 Oracle server cores to 2 Linux engines on zEnterprise



* Source: IBM (Distributed server comparison is based on IBM cost modeling of Linux on zEnterprise vs. alternative distributed servers. Given there are multiple factors in this analysis such as utilization rates, application type and local pricing, etc.; savings may vary by user.

Linux on System z: ROI proof point
worldwide manufacturer

Worldwide manufacturer of electric motors and power transmission products

Challenge

Business growth and acquisitions were causing server sprawl

- Running SAP on distributed systems model
- Hardware upgrades were resource intensive and expensive
- Required faster connectivity to DB2 on System z
- Wanted one solution/platform to manage
- Wanted one target for backups

Solution

- Migrated their global SAP implementation to Linux on System z
- Use UPSTREAM for Linux on System z for data backup and recovery and to ensure business continuity

Benefits

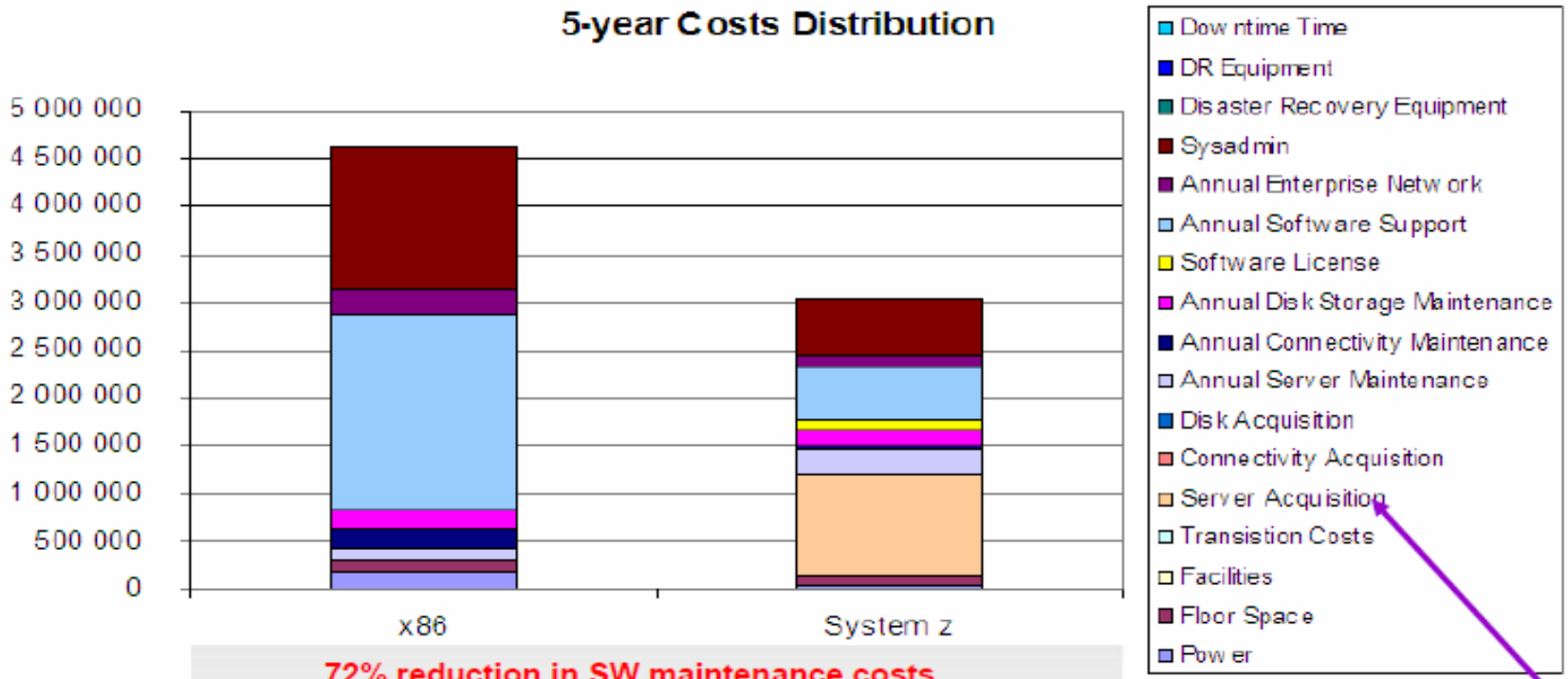
- Have driven down IT costs to less than 1% of revenue (compared to industry average of about 3%)
- Greatly reduced software costs (particularly operating environment costs)
- Eliminated numerous Unix servers (and corresponding human-related management costs)
- Increased utilization of systems environment
- Experienced 31% improvement in application response time after migrating SAP from AIX to Linux on System z

increased efficiency from Linux on System z consolidation

Customer	Distributed Cores	Ratio of Distributed to IBM System z cores	Additional Benefits
Insurance Company	60	30 to 1	48 hour migration
Government Agency	292	58 to 1	70% cost savings
Large Bank	200	50 to 1	$9M savings
Bank in Russia	200	50 to 1	Reduced payment processing costs by 95%
Trading Company		40 to 1	Scale and availability

Source: IBM – The Art of the Possible: Linux Workload Consolidation on System z (Feb 2011)

Customer saves $1.5M with Oracle on 1 System z
versus 45 Oracle x86 servers



5-year Cost Comparison	1st Year	2nd Year	3rd Year	4th Year	5th Year
x86	923 625	1 847 250	2 770 874	3 694 499	4 618 124
System z	1 482 559	1 871 822	2 261 085	2 650 348	3 039 611
Delta	558 934	24 572	-509 789	-1 044 151	-1 578 513

large bank reduces space, energy requirements, saves $1.5m+
(details for previous slide)

	FROM Distributed …	TO Linux on System z …
Hardware infrastructure	45 x86 (HP + Dell)	IBM System z10 Enterprise Class
Footprints	45	1
Cores	111	4 IFLs
Average utilization	Less than 10%	60%
Peak utilization	35%	85%
# DBs, size of DB	111 Oracle DB	111 Oracle DB
Application	Oracle 10G databases	Oracle 10G databases
OS	Linux	Linux on System z + z/VM
Energy usage		75% less
Floor Space usage		28% less
TCO: 5 years	$4.62M	$3.04M / savings: $1.58M

Summary of Benefits:

- 111 to 4 core reduction, 27:1 footprint reduction
- Up to 72% software maintenance cost reduction
- Improved application reliability, and efficient disaster recovery capabilities

financial customer saves 95% on power and cooling

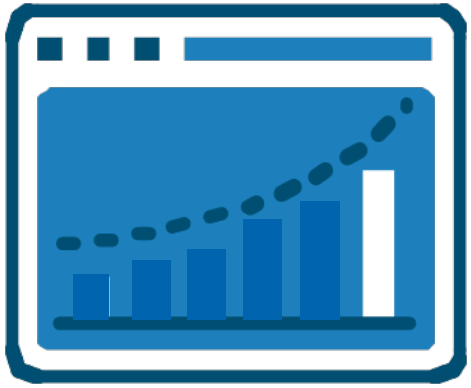
	FROM Distributed …	TO Linux on System z …
Hardware infrastructure	Sun and HP servers	IBM System z10 Enterprise Class
Footprints	61	1
Cores/Memory	442 cores / 1440 GB	16 IFLs / 82 GB
Average utilization	13.3%	40%
Peak utilization	28.7%	92%
# DBs, size of DB	61	61
Application	Oracle databases	Oracle databases
OS	Sun Solaris	Linux on System z + z/VM
Energy usage		
Power & cooling (Whr)	345,618 Whr	14,766 Whr -> 95% less
Heat (BTUs/hr)	737,030 BTUs/hr	39,648 BTUs/hr -> 94% less

Summary of Benefits:

- Software savings, energy requirements reduced, better utilization

achieving Linux on System z cost saving benefits
optimized utilization

Optimizing CPU utilization is how organizations are achieving significant cost savings benefits with Linux on System z



Key to high processor utilization is proper systems management

Financial system – 27 IFLs on one CEC running 85% utilization

Insurance company – 7 IFLs often running above 95% utilization

Credit card company – runs 12 IFLs consistently above 95% utilization

CA Solutions for Linux on System z
strategy

Secure

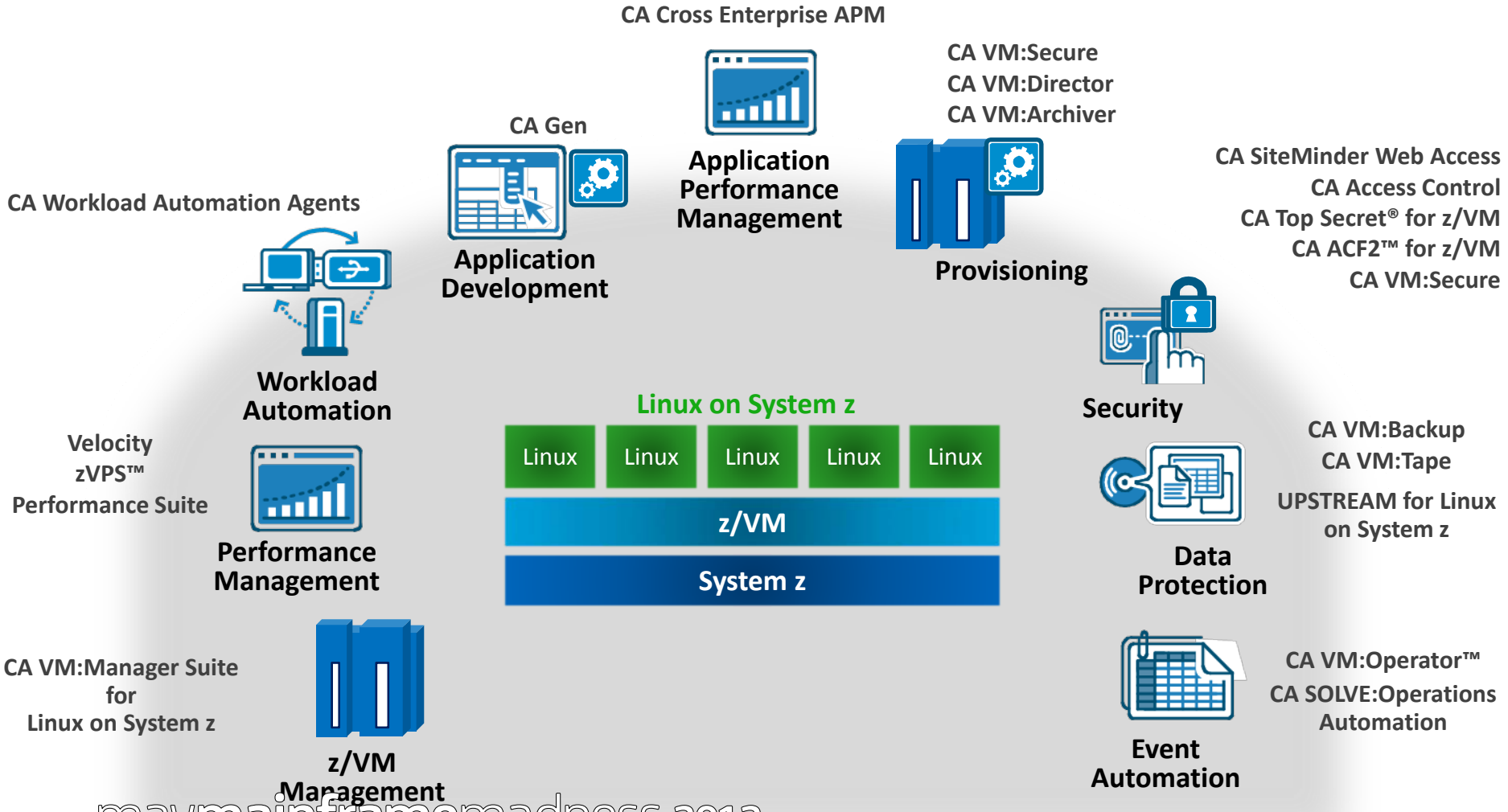
Agile

Optimized

- Simplify the management and security of Linux on System z with a comprehensive and integrated management suite
- Make Linux on System z a cost-effective choice for customers
- Agility delivered - allow clients to quickly deliver capacity on demand with Linux on System z

CA solutions for Linux on System z

comprehensive, best in class portfolio



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how are organizations using Linux on System z?

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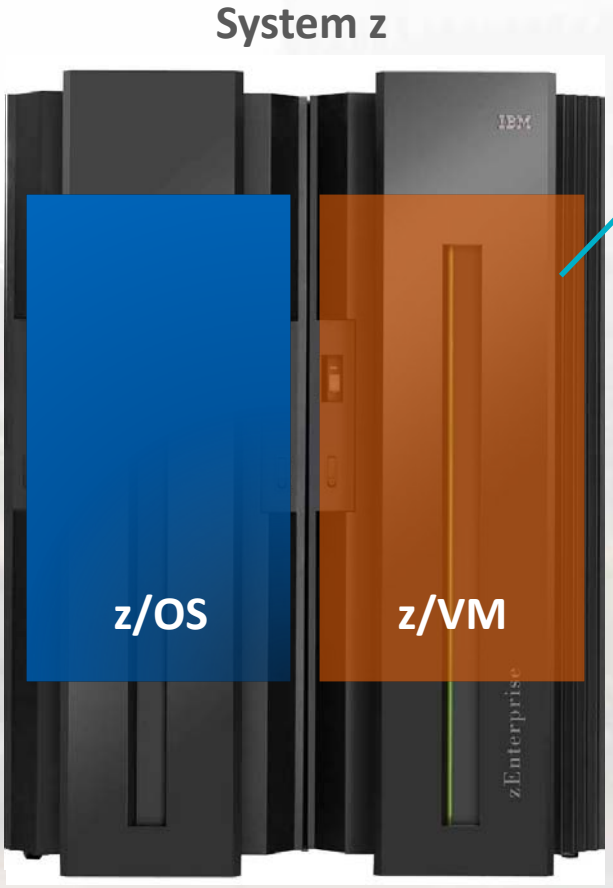
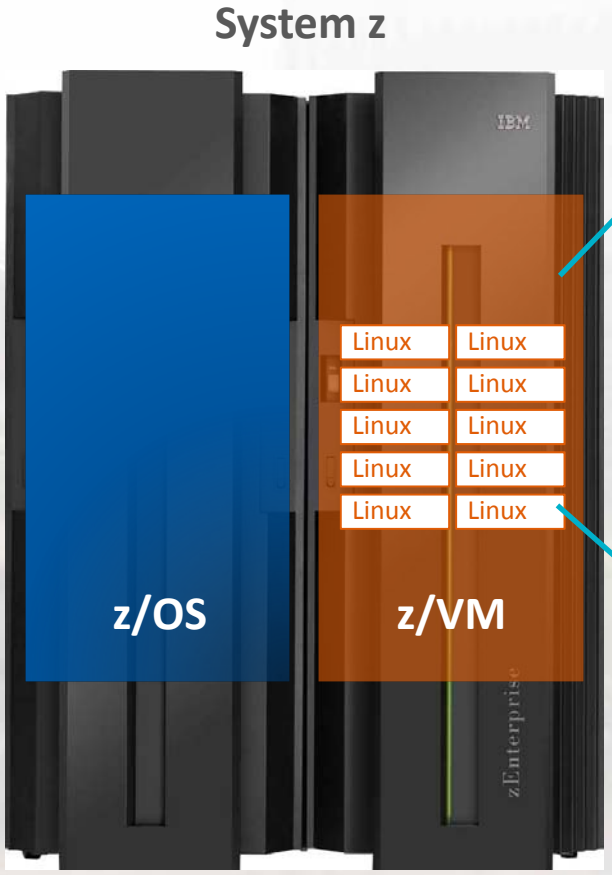


Add IFL engines to existing mainframe to provide Linux capacity

No increase in power or floor space requirements

how are organizations using Linux on System z?



Add IFL engines to existing mainframe to provide Linux capacity

No increase in power or floor space requirements

Deploy workloads on virtualized Linux servers running under z/VM

how are organizations using Linux on System z?

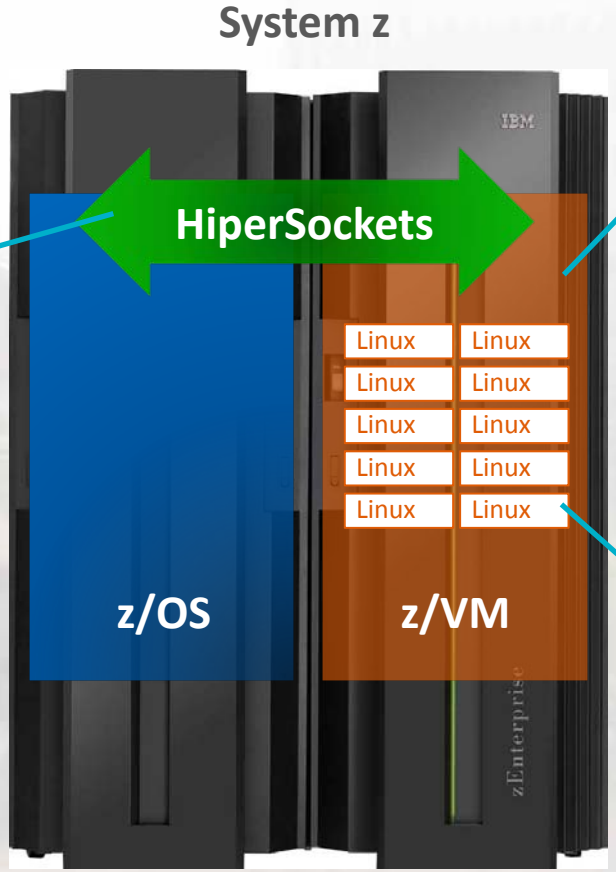
HiperSockets connect z/OS and z/VM LPARs

Remove communication traffic from corporate network

Eliminate need for firewalls, switches, routers, etc…

Lower cost and increase bandwidth

Provide greater network security



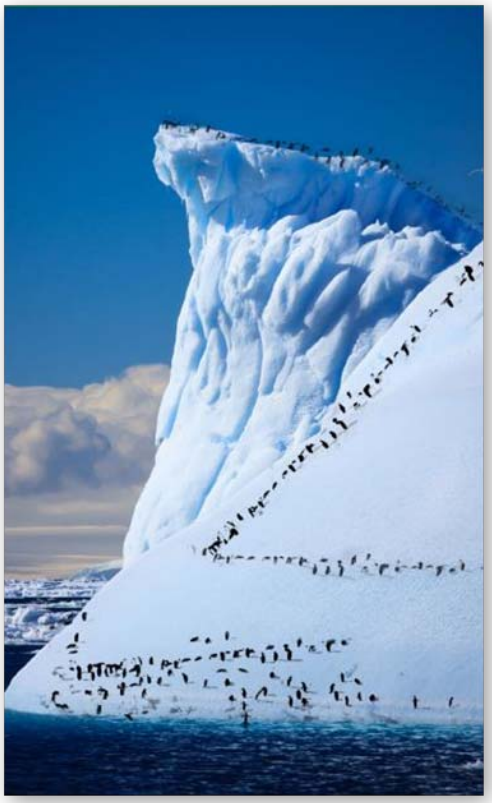
Add IFL engines to existing mainframe to provide Linux capacity

No increase in power or floor space requirements

Deploy workloads on virtualized Linux servers running under z/VM

what workloads are being moved to Linux on System z?

- Web Servers – *Apache, WebSphere IHS*
- Web Application Servers – *WebSphere WAS*
- Development – *coding, testing, QA*
- Databases – *Oracle, MySQL, DB2 for z/OS*
- Applications – *SAP, Cognos, Lotus Notes Domino*
- Linux on System z application characteristics:
  - Web applications that access z/OS database
  - Have high disaster recovery requirements
  - I/O-intensive applications
  - Have requirements for real-time server provisioning that may peak at different times



managing and securing z/VM virtual environment

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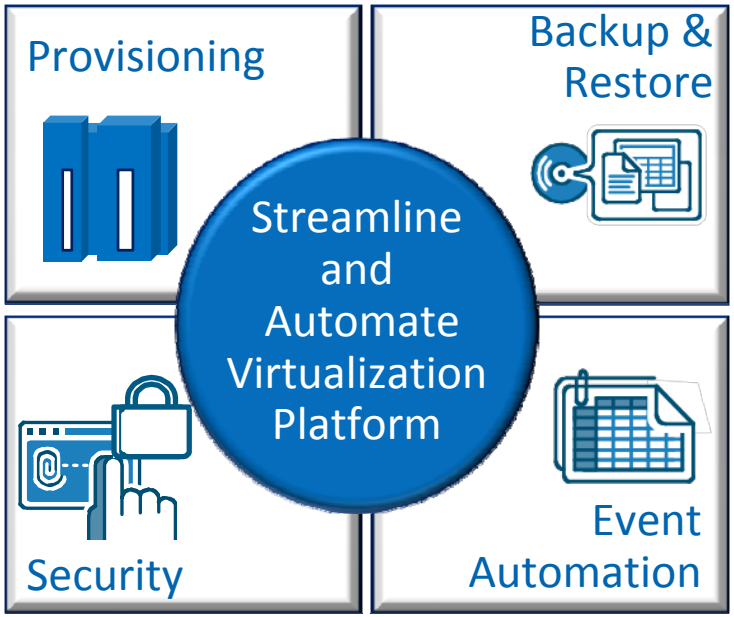
automate z/VM management

z/VM Challenges

- Growing Linux workload capacity
- Managing and securing z/VM and Linux environments
- Reducing time and cost of manual tasks
- Controlled, safe resource sharing
- z/VM performance monitoring
- Device sharing, media protection



How CA Helps You Address these Challenges

- Reduce human intervention and errors
- Remove complexity and lower costs for both z/VM and mainframe Linux environments by automating routine, labor-intensive tasks
- Scale to handle large Linux deployments with thousands of virtual Linux guests

CA VM:Manager™ Suite for Linux on System z

new releases of CA z/VM products simplify environment

Security

CA Top Secret® for z/VM
CA ACF2™ for z/VM
CA VM:Secure

Disk Storage Assets

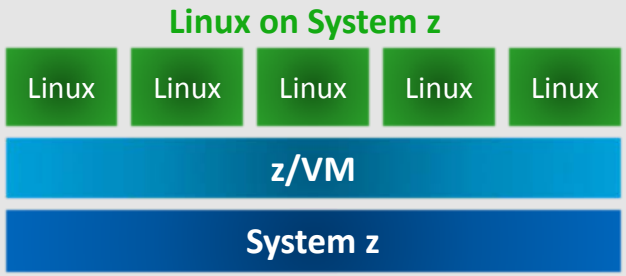
CA VM:Account™
CA VM:Director™

Storage Backup/Recovery

CA VM:Backup™ (HiDRO)
CA VM:Archiver

Resource Chargeback

CA VM:Account™



Performance Tuning

CA Explore® Performance Management for z/VM

CA VM:Operator™

Operations Management

CA VM:Operator™
CA VM:Schedule™
CA VM:Spool™
CA VM:Sort™
CA VM:Batch™

Provisioning

CA VM:Director™
CA VM:Secure
CA VM:Archiver™

Tape Management

CA VM:Tape™
CA Dynam/T for z/VM

optimizing Linux on System z performance

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Velocity zVPS™ Performance Suite
optimize z/VM and Linux on System

Recognized leader in z/VM and Linux on System z performance measurement and capacity planning

Velocity zVPS™ Performance Suite

Combine **multi-platform system management and security expertise** from CA Technologies…

…with the **performance measurement expertise** from Velocity

- Complements CA VM:Manager Suite for Linux on System z with best in class performance management for Linux on System z
- Operational alerts can be viewed in:
  - CA SYSVIEW® Performance Management
  - CA NetMaster® Network Management
  - CA OPS®/MVS Event Management and Automation
- Data can be processed in CA MICS® Resource Management for chargeback
  - Data captured at the process level

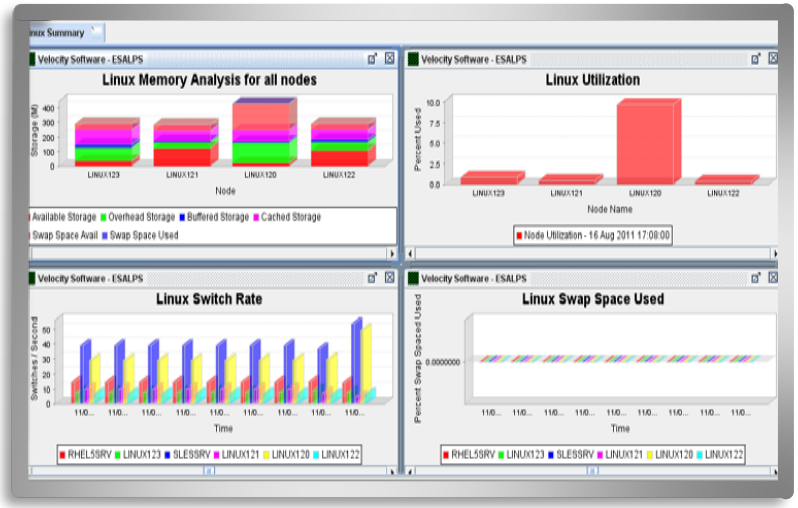
Velocity zVPS™ Performance Suite
key capabilities

Performance Analysis

- Real-time metrics on all facets of performance for all servers including z/VM, Linux on System z and distributed servers
- Enables immediate analysis of real-time problems

Capacity Planning

- Providing trend data for projecting capacity requirements of future workloads
- Interfaces to popular enterprise capacity planning facilities console



Graphical display of up-to-the-minute Linux on System z performance data

Chargeback and Accounting

- Delivers data needed for chargeback and accounting, with complete and accurate data for both Linux on System z applications and z/VM virtual machines

Operational Alerts

- Performance and capacity issues can be immediately detected and reported
- Provides alerts via a 3270 interface, web-based browser, and via SNMP alerts to integrate into your management console

getting started with Linux on System z consolidation
use benchmarking to bridge the IT operations-business gap

How do we get started?

"We have IFL's but are not using them, how do we get started?"

Which workloads are best fit?

"How do we determine which workloads would be good to consolidate to Linux on System z?"

How do we get buy-in across organization?

"We've identified good workloads, but…
…how do we get buy-in to move forward?"

IT Executives

Help IT make decisions based on delivery of business services at an optimal performance and cost.

Operations Managers

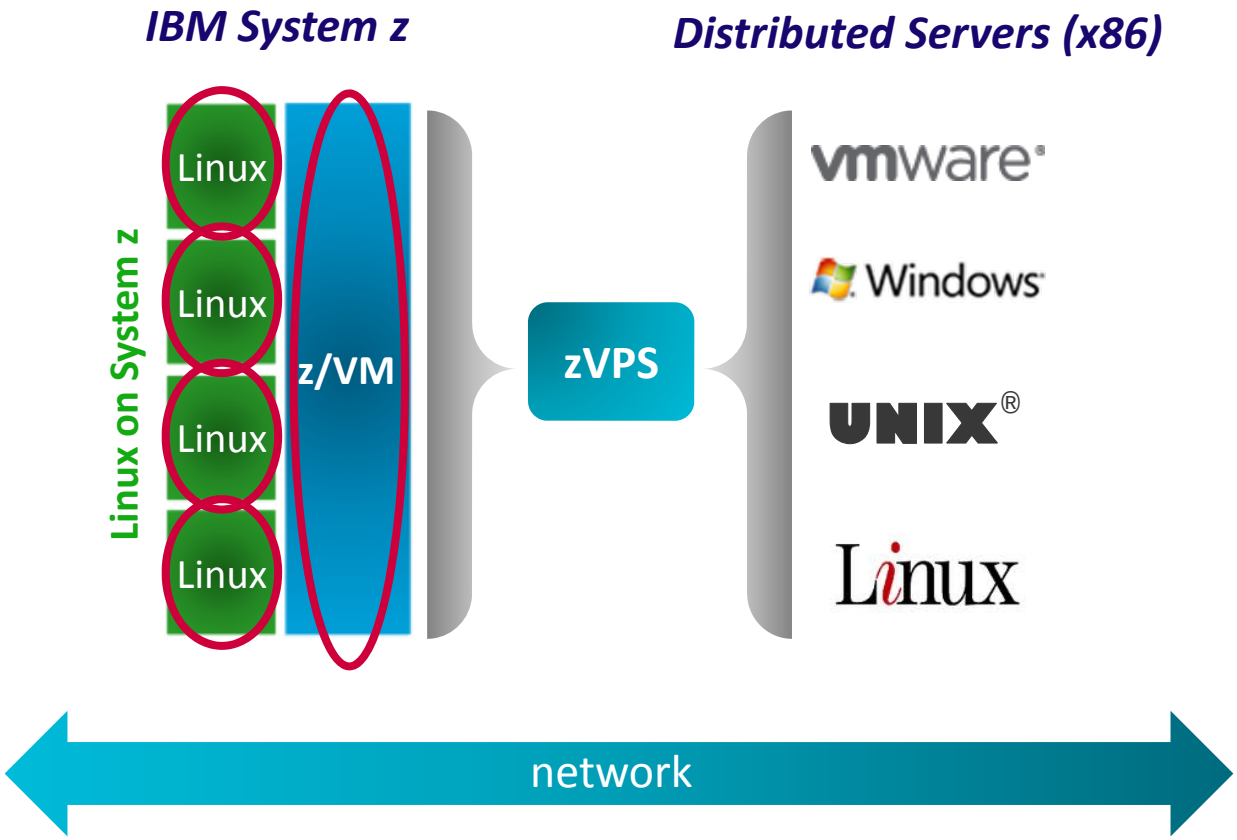
Provide detail performance data for both Linux on System z and distributed workloads for accurate comparison and analysis.

Business Owners

Use accurate and detail data to show businesses how their SLA's can be met at a lower cost.

zVPS data collection
comprehensive view of performance data

When planning a consolidation project, gather accurate data and execute benchmarks to determine the best platform to run your workloads



protecting Linux on System z application and system data

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UPSTREAM for Linux on System z
best-in-class data protection

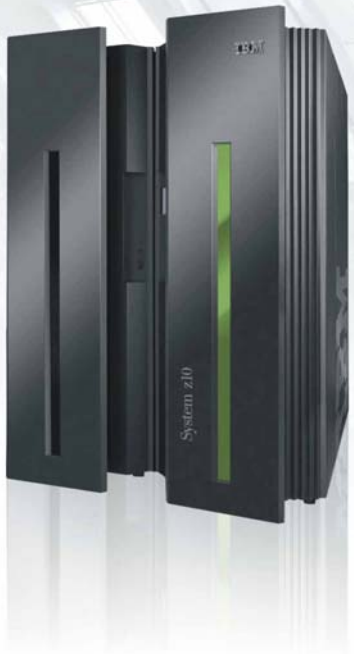
Business Continuity

- **Fast, scalable** and highly **reliable** backup and recovery for Linux on System z
- **Only** solution that will **backup up to z/OS**
  - Leverage existing z/OS skills and infrastructure for operational efficiency
  - Rely on proven z/OS disaster recovery strengths

Peace of Mind

UPSTREAM for Linux on System z
leverage existing z/OS infrastructure

- Leverage existing z/OS infrastructure including tape management, security and scheduling
  - Automate and integrate backup operations with CA 7® Workload Automation and CA OPS/MVS® Event Management and Automation
  - Control retention and manage backup tapes with CA 1® Tape Management
  - Control access to backup and recovery operations through CA ACF2™ or CA Top Secret®

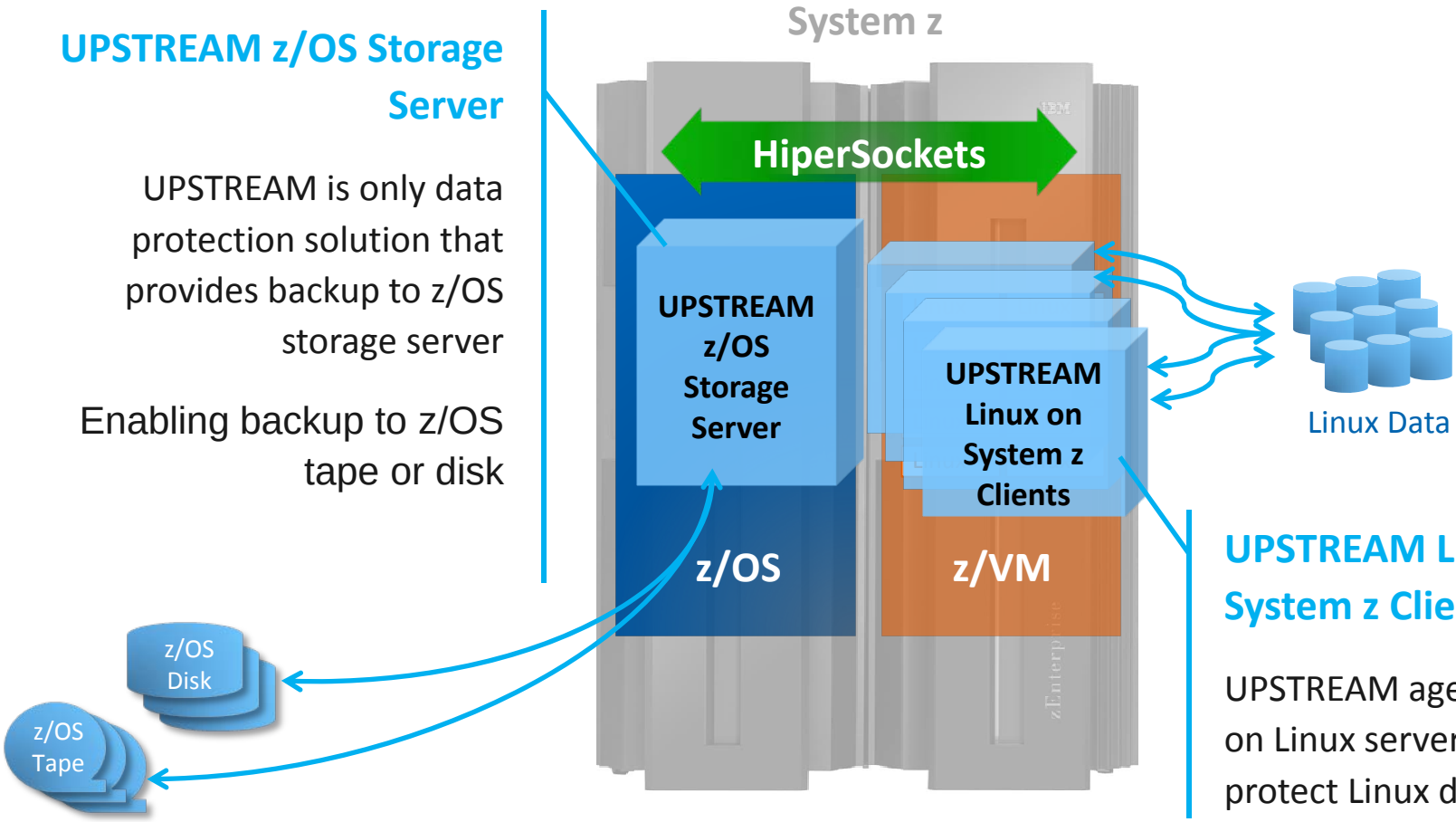


UPSTREAM for Linux on System z
architecture

UPSTREAM z/OS Storage Server

UPSTREAM is only data protection solution that provides backup to z/OS storage server

Enabling backup to z/OS tape or disk



UPSTREAM Linux on System z Clients

UPSTREAM agents run on Linux servers to protect Linux data

additional CA solutions that optimize Linux on System z

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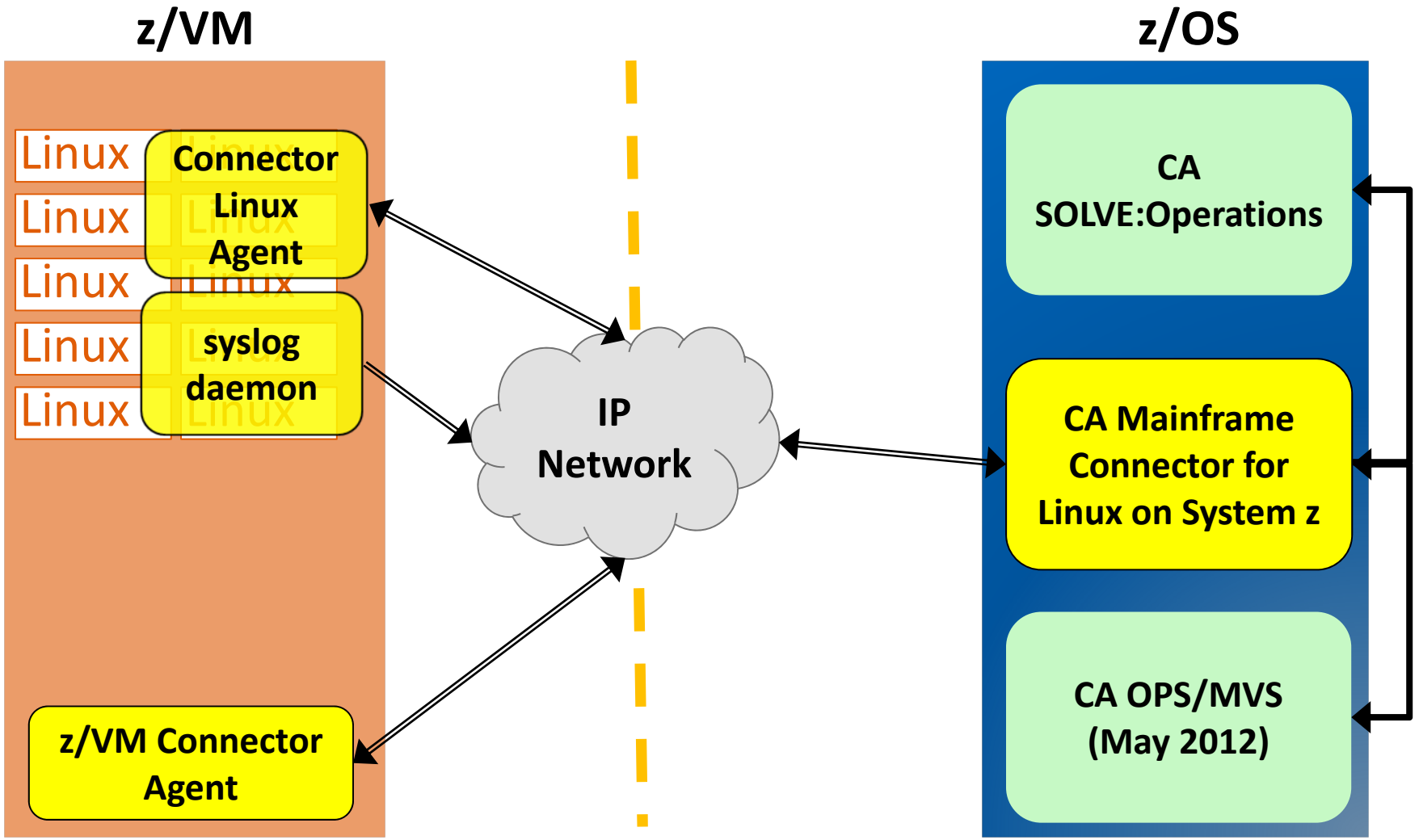
CA Mainframe Connector for Linux on System z



Cross-platform automation and integrated message handling for Linux on System z

VM and Linux resources managed from one pane of glass

automate z/Linux operations
command and response function

Bounce (shut down and immediately restart) a z/Linux guest	Bounce (shut down and immediately restart) a z/VM host and all of its z/Linux guests	Establish automated SLAs for z/Linux applications
Schedule the restart of a z/Linux guest.	Recover a z/Linux guest after an abend or unexpected shutdown (validate and start applications in the right order, etc).	Check and report the status of a z/Linux application.
Stop a z/Linux application, Start a z/Linux application.	Use Linux commands to perform operational processes against a z/Linux application	Establish Services that include both z/OS and z/Linux resources

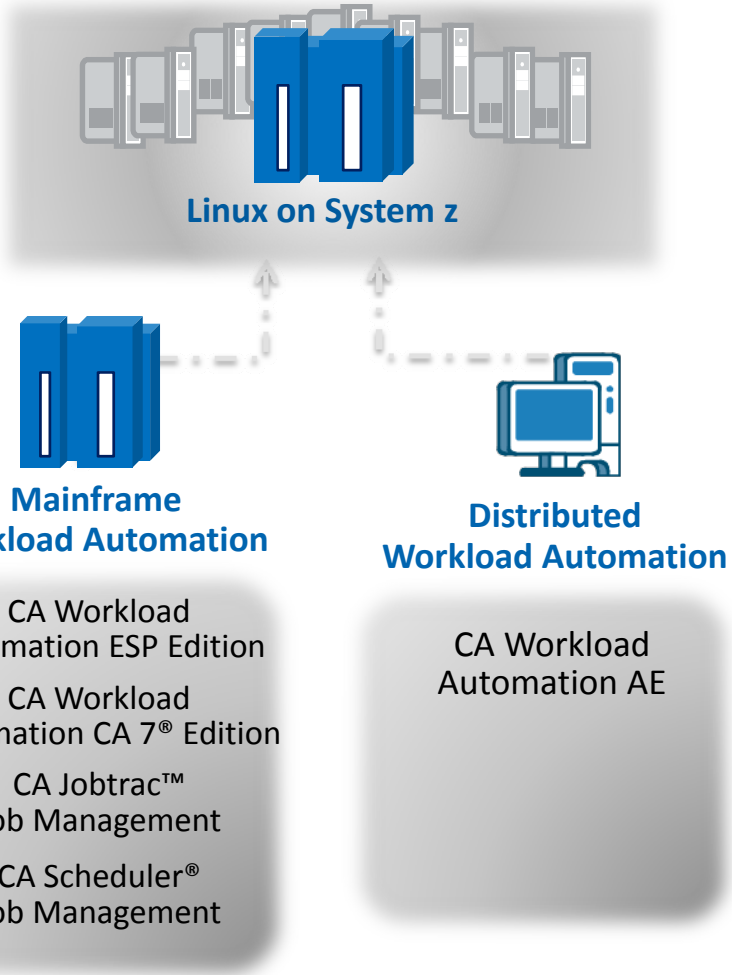
CA solutions for flexible workload automation

Challenge

- Need to streamline management of workloads running on Linux on System z
- Require support across multiple platforms

CA Cross-Platform Workload Automation

- Automate scheduling, execution and tracking of important Linux on System z workloads
- Collaboratively run Linux on System z workloads using CA mainframe and distributed workload management products



secure entire z/VM and Linux on System z infrastructure

CA SiteMinder®
Web Access

Application security for web applications running on Linux on System z

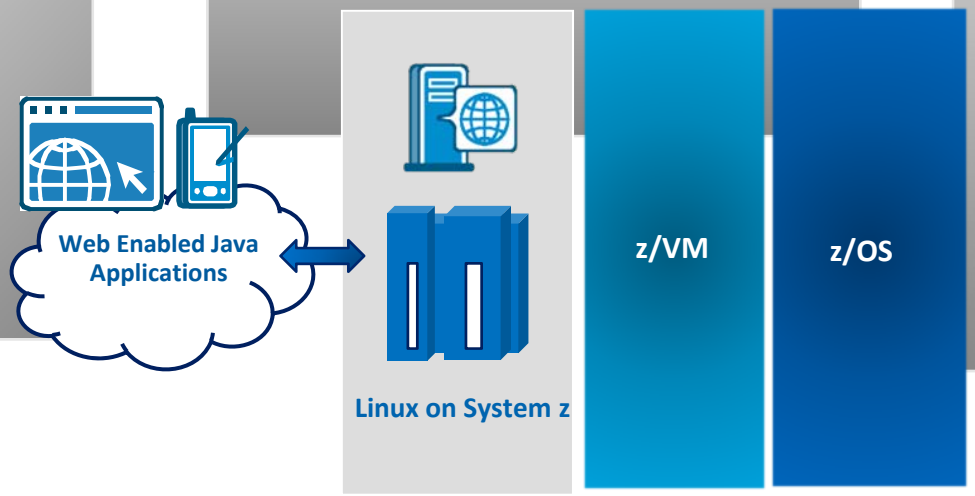
CA Top Secret® for z/VM
CA ACF2™ for z/VM
CA VM:Secure
CA Access Control

Resource protection for z/VM and Linux operating system resources such as programs, files, directories, etc.

CA PAM Client for Linux

Integrated user authentication

Validate Linux identities against existing z/OS or z/VM user definitions



additional CA solutions supporting Linux on System z

CA Easytrieve®	▪ Information retrieval and report writing for Linux on System z
CA MIM™ Resource Sharing	▪ Automate resource sharing for storage and tape devices and improved console management.
CA Gen	▪ Modernize applications to Linux on System z using model-driven development; reuse assets and migrate without rewriting code.
CA XCOM™ Data Transport	▪ Reliably and securely transfer mission critical data across multiple platforms including Linux on System z.
CA Storage Resource Manager	▪ Enterprise wide view of storage resources across multiple platforms, including Linux on System z.
CA Workload Automation	▪ Automate scheduling, execution and tracking of Linux on System z workloads using CA mainframe or distributed workload management solutions.
CA SYSVIEW° Performance Management	▪ End-to-end view of web enabled Java applications running on Linux on System z; understand where in the stack problems may be occurring.
CA APM (formerly CA Wily)	▪ Monitor performance of Linux on System z web enabled Java applications and troubleshoot problems before they occur.
CA SiteMinder® Agent	▪ Secure web applications running under Linux on System z.
CA ControlMinder	▪ Control access to Linux on System z servers, applications, and devices through host access control and privileged user management.

CA Linux on System z Solutions Strategy and Roadmap

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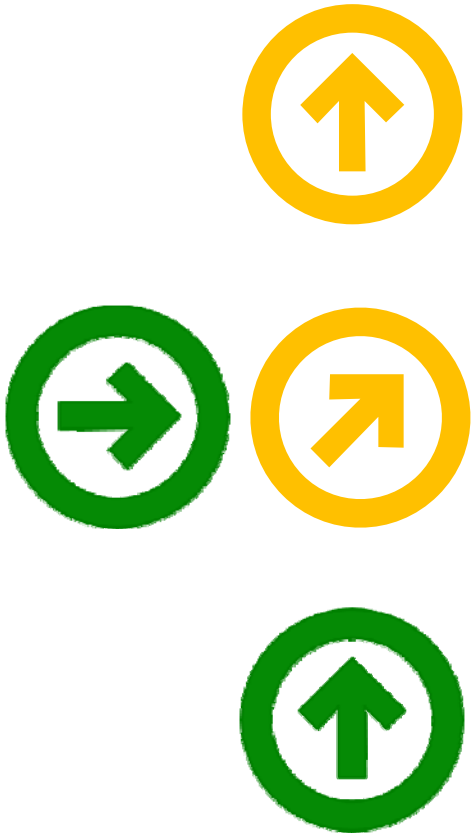
Linux on System z overall strategy

- Simplify the management and security of Linux on System z with a management suite
  - Deliver a management and security suite for Linux on System z that can be managed by both mainframe and distributed staffs
  - Empower customers with the ability to consolidate distributed Linux servers onto Linux on System z
- Make Linux on System z a cost-effective choice for customers
  - deliver a full lifecycle management solution for Linux on System z
- Agility delivered
  - allow clients to quickly deliver capacity on demand with Linux on System z

Roadmap Overview

- Day One support for future z/VM and Linux on System z distributions
- Exploitation of z/VM Single System Image
- Deliver additional products in IBM VMSES/E format in support of CA's Next-Generation Mainframe Management strategy
  - CA Dynam/T Tape Management for z/VM
  - CA VM:XMENU
  - CA VTERM
  - CA Top Secret and CA ACF2
- Deliver enhancements to improve Linux guest management and as a foundation for Cloud solutions
- Deliver enhancements in response to customer demand



Improve capability to manage Linux on System z guests

- Integration of zVPS and UPSTREAM for Linux on System z with CA VM:Manager Suite to enhance management of z/VM and Linux on System z environments
  - modernize the user interfaces
  - simplify reporting capabilities
  - automate and simplify Linux on System z provisioning
- CA VM:Operator enhancements to allow simpler and more secure automated management of Linux on System z guests

Velocity zVPS Performance Suite possible integrations

- VM:Secure and VM:Director
  - Provide interface for dynamic creation of zVPS virtual machines during installation
- Top Secret, ACF2 and VM:Secure
  - Provide interface to dynamically define security policies for zVPS virtual machines during installation
- VM:Operator
  - Current integration involves messaging OPERATOR from zVPS
  - Provide MONALERT file with standard alerting format for VM:Operator (and possibly a MONALERT for SPECTRUM traps)
  - Policy package for with routing tables, default actions and scripting based on a best practices guide

Velocity zVPS Performance Suite possible integrations (continued)

- VM:Account
  - Collecting zLinux performance metrics from zVPS
- Wily APM
  - Integrate zVPS performance and status metrics as an agent to APM's Enterprise Manager and workstation
- SYSVIEW
  - Integrate zVPS performance data and metric directly into SYSVIEW
  - Perhaps these metrics feed into Wily APM

UPSTREAM for Linux on System z possible integrations

- Vantage SRM
  - Integrate UPSTREAM backup details and status for zLinux
- Chorus for Mainframe
  - Integration of UPSTREAM into Storage Role
  - May be able to obtain from Vantage integration
- OPS/MVS and SOLVE:Operations
  - Policy package for UPSTREAM Storage Server events based on best practices guide

CA AppLogic® – what is it?

CA AppLogic is a turnkey cloud computing platform

Enables enterprise customers to quickly provision, deploy, and manage cloud applications and supporting infrastructure

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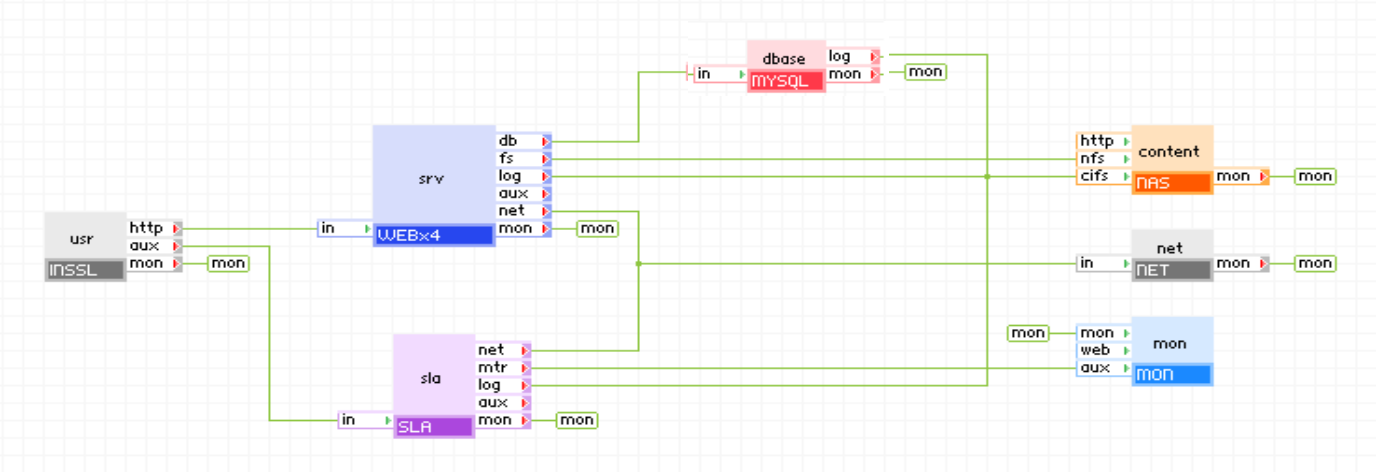
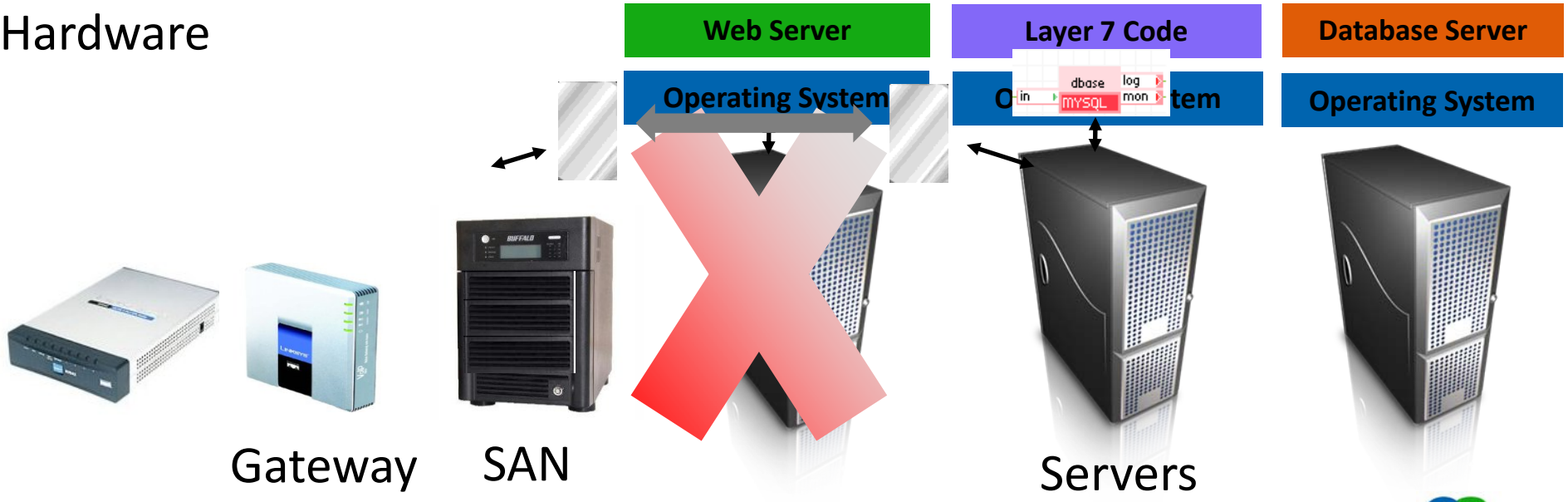
CA AppLogic – how does it work?

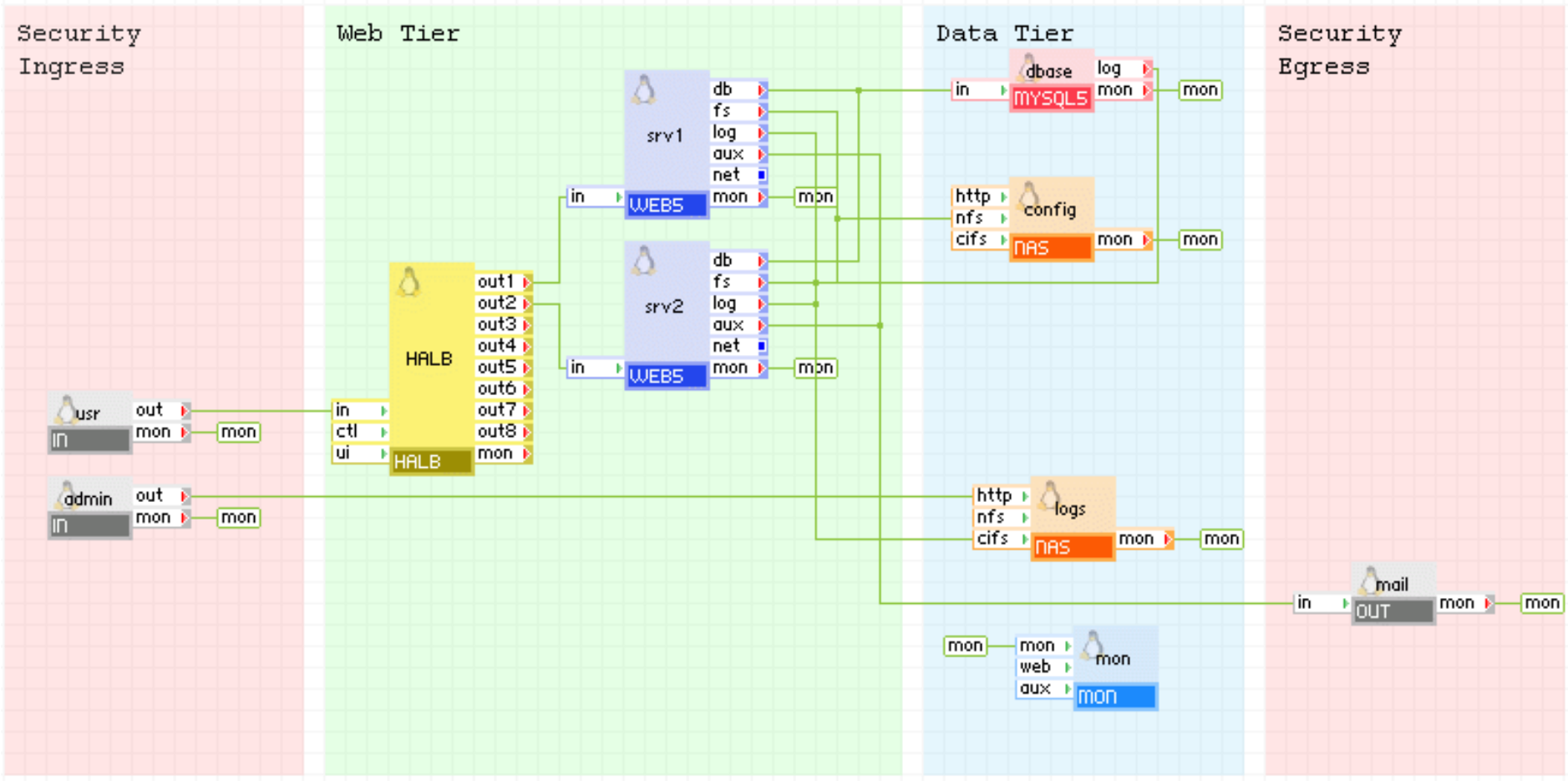


Software

Hardware



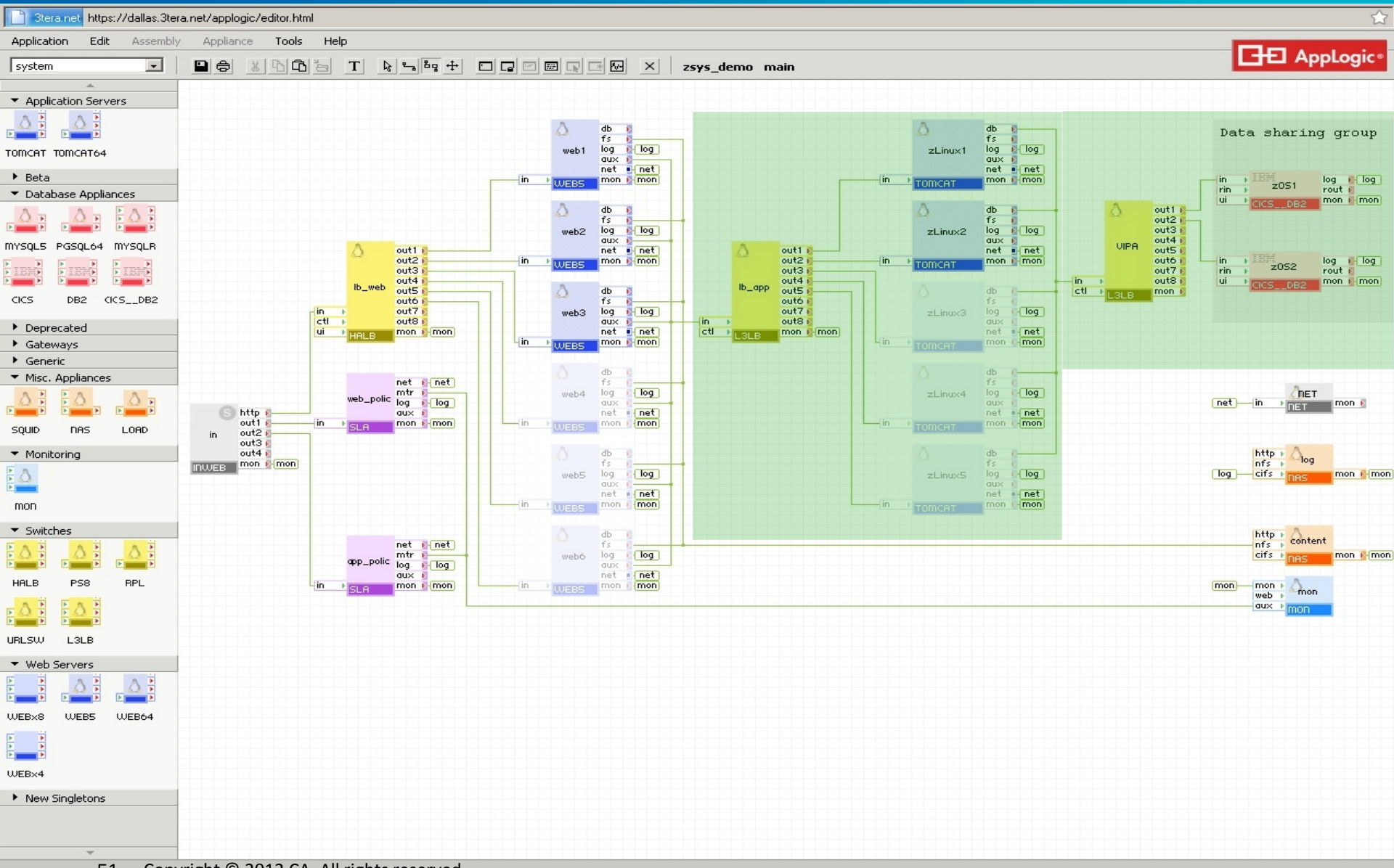
CA AppLogic – more than virtualization



CA AppLogic for Mainframe
use cases for mainframe as part of a cloud strategy

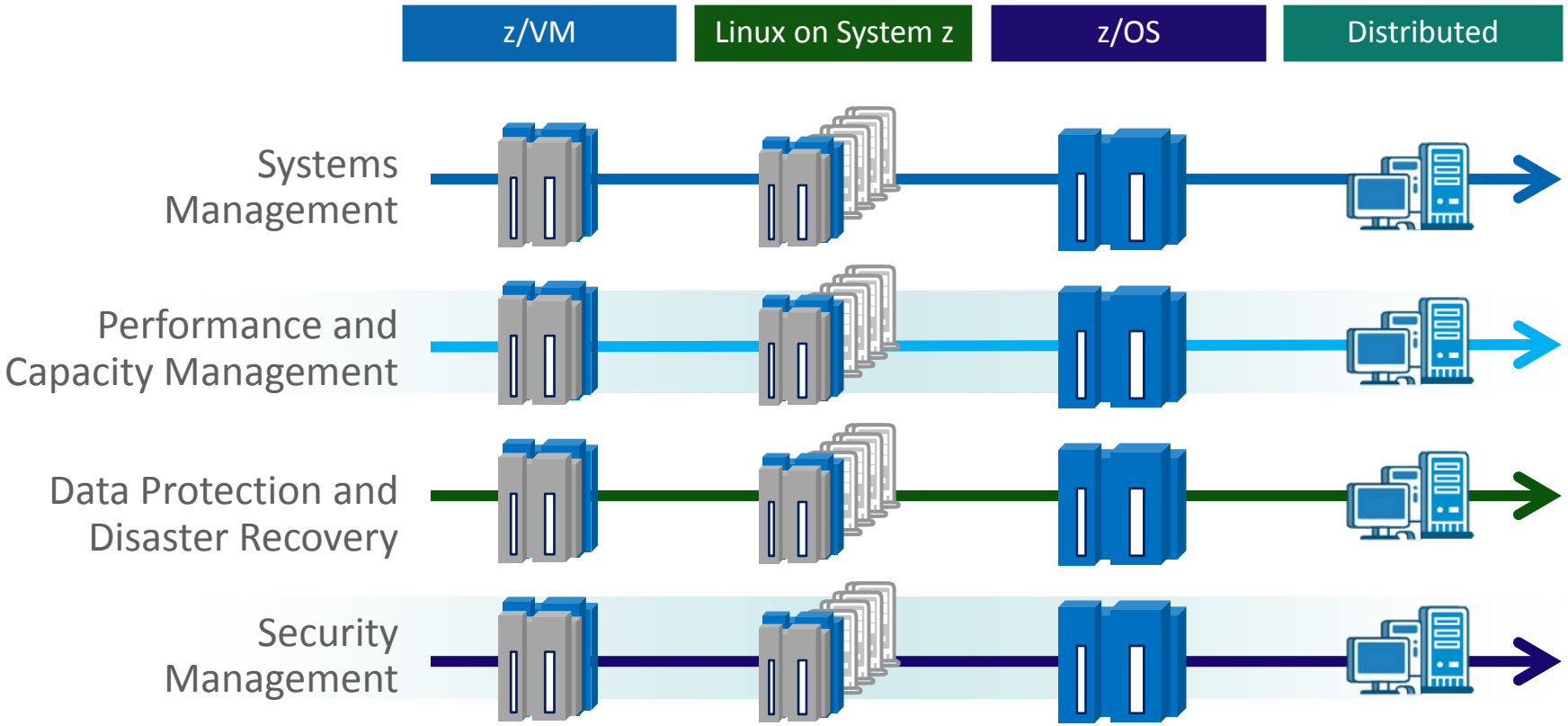
- Focus on managing complete services, in a scalable, dynamic way
- Initial target use cases:
  - Migrating distributed workloads to Linux on System z
    - Candidates are those that connect to z/OS
  - Creating new workloads on System z
  - Allow use of Compound Services that cross platforms
  - The combination of low cost, massive scalability, reduction in network and hardware needs is driving re-hosting efforts across many customers. CA AppLogic can be an accelerator of these trends by removing technical and political barriers.
  - In general, use of the mainframe platform as a cloud delivery platform

CA AppLogic encompassing Linux on System z and z/OS



Summary

CA Technologies cross-platform enterprise management



CA management for Linux on System z
comprehensive, best in class portfolio

Systems Management

CA VM:Manager™ Suite for Linux on System z

CA Workload Automation

CA VM:Archiver™
CA VM:Director™
CA VM:Schedule™
CA VM:Spool™
CA VM:Operator™
CA VM:Tape

Data Protection and Disaster Recovery

UPSTREAM for Linux on System z

CA VM:Backup (HiDRO)

Performance and Capacity Management

Velocity zVPS™ Performance Suite

Security Management

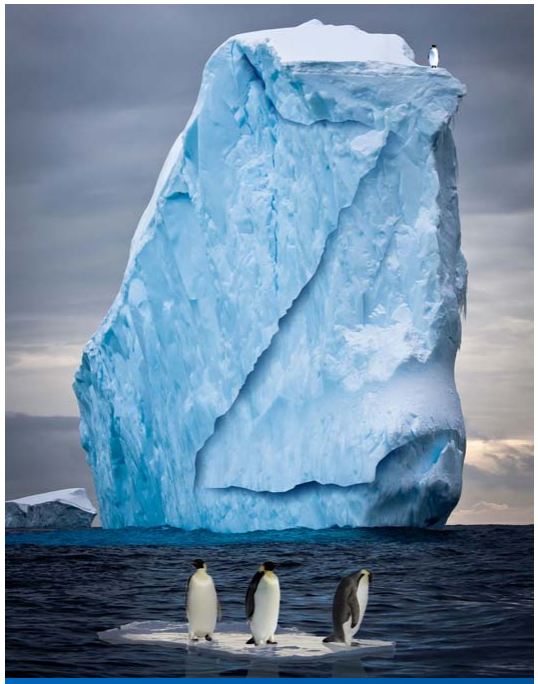
CA Top Secret® for z/VM
CA ACF2™ for z/VM
CA VM:Secure

Provisioning

CA VM:Secure
CA VM:Director™
CA VM:Archiver
CA AppLogic for Mainframe (2012)

ca.com/mainframe/linux

for more information



Linux on System z offers significant cost savings…

…but who can help you optimize it?

CA Technologies can

- Join me in the Linux on System z booth where I will be available for an informal Q&A
- Check out the many presentations, analyst ROI papers and best practice documents
- Take the Linux on System z and Cloud surveys
- Contact me at john.klonaris@ca.com

thank you

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ca technologies