

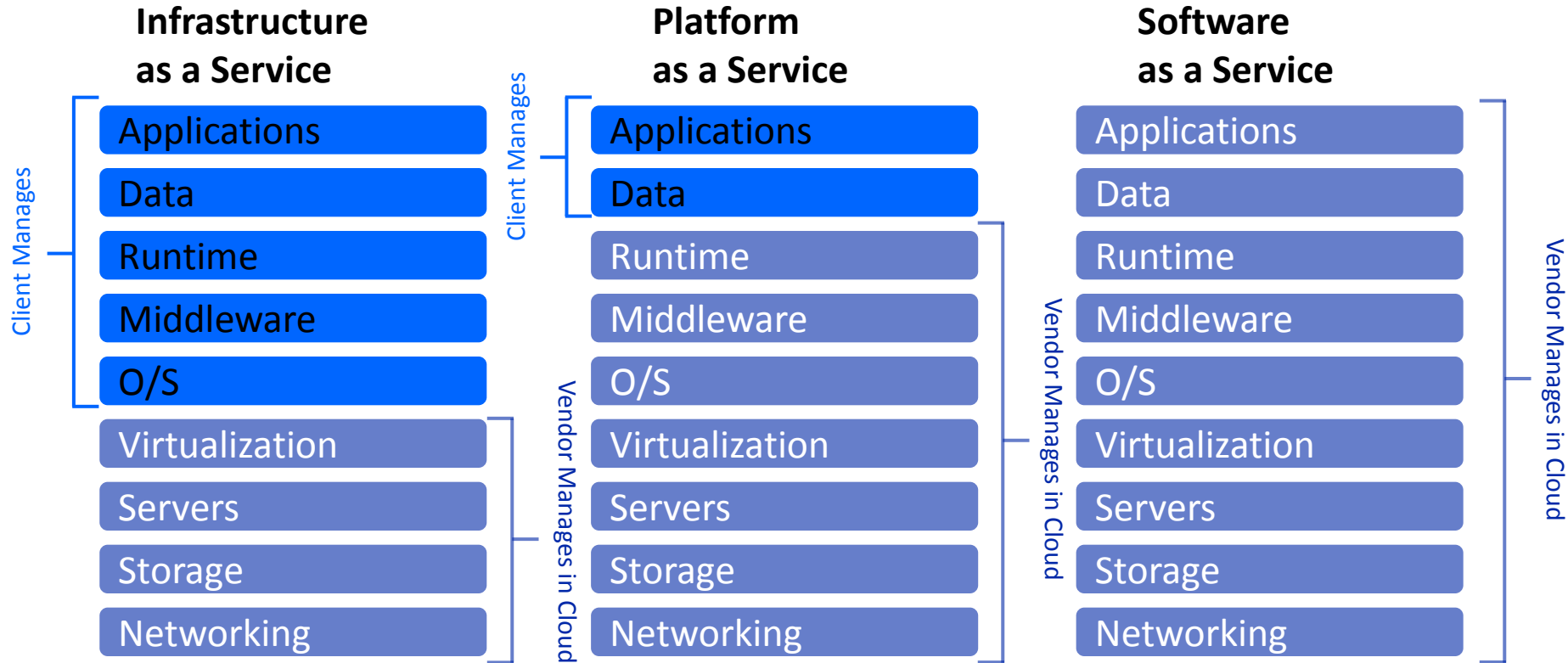
# Practical Options For Building A Cloud

David Rhoderick  
IBM Corporation

Wednesday, August 14, 2013  
13660



# Some Basics – Cloud Service Models



Customization; higher costs; slower time to value

Standardization; lower costs; faster time to value

# Lots Of Options

- Public cloud vendors
  - ▶ Amazon EC2
  - ▶ Microsoft Azure
  - ▶ Oracle
  - ▶ IBM (SCE and SCE+)
  
- “Open” initiatives
  - ▶ Heroku (public PaaS platform with many open source add ons)
  - ▶ Cloud Foundry
  - ▶ OpenStack (being adopted by IBM)
  
- Private cloud options
  - ▶ Oracle Exa stack
  - ▶ VCE Vblock
  - ▶ IBM PureSystems and Enterprise Systems

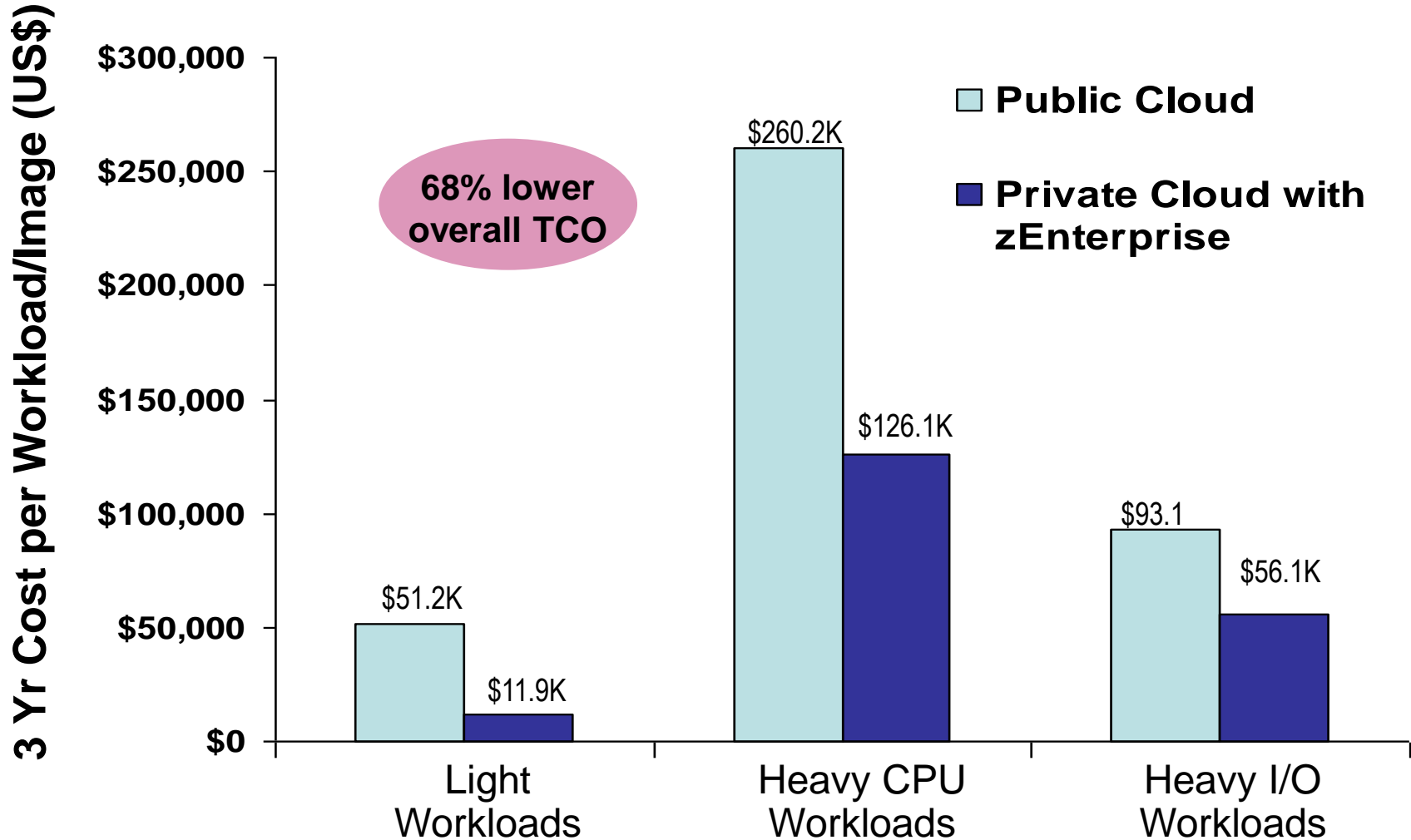
# Public Clouds Scale ... But Not Economically

		IBM zEnterprise Linux Server Cost	Typical x86 Cost	Typical Public Cloud*	
				Vendor 1	Vendor 2
zBC12	100 VMs	\$221.42	\$174.38	\$135.05	\$139.34
	200 VMs	\$131.77	\$138.55		
	500 VMs	\$79.65	\$109.26		
zEC12	500 VMs	\$87.53	\$109.26		
	1600 VMs	\$57.94	\$101.11		
	3200 VMs	\$47.57	\$101.11		

\*Published WWW pricing 05-28-2012

Source: IBM Analysis. Includes HW, SW licensing, service & support, energy usage, floor space, and IT personnel costs. All prices per VM per month and assuming 24x365 availability & usage

# Comparison Of Acquisition And Labor Costs – Public vs Private Cloud With zEnterprise



68% lower overall TCO

Source: IBM internal study. zEnterprise configurations needed to support the three workload types were derived from IBM comparisons. Public cloud sizing needed to support the three workload types was calculated based on compute capacity of public cloud services. 3 yr TCO for public cloud based on pricing info available by the service provider. 3 yr TCO for zEnterprise includes hardware acquisition, maintenance, software acquisition, S&S and labor. US pricing and will vary by country.

# Other Concerns About Public Clouds

## ■ Lack of Reliability

- January 2013, Amazon, 49 minutes
  - \$4M lost in sales
- Three outages in 2012, Amazon
- Three outages in 2011, Amazon, 4+ hours total
- April 2011, MS Azure, 6 hours
- Jan 2011, Salesforce, 1 hour
- May 2010, Amazon, 4 outages in 1 week
- April 2010, MS Azure, 40 mins
- June 2009, Amazon, 5 hours
- March 2009, MS Azure, 22 hours



## ■ Lack of Security/Compliance

- ▶ *"No, your data isn't secure in the cloud"*  
[http://www.computerworld.com/s/article/9241553/No\\_your\\_data\\_isn\\_t\\_secure\\_in\\_the\\_cloud?source=CTWNLE\\_nlt\\_dailyam\\_2013-08-13](http://www.computerworld.com/s/article/9241553/No_your_data_isn_t_secure_in_the_cloud?source=CTWNLE_nlt_dailyam_2013-08-13)
- ▶ Isolation of applications and data, data encryption/segregation
- ▶ Compliance with laws and regulations

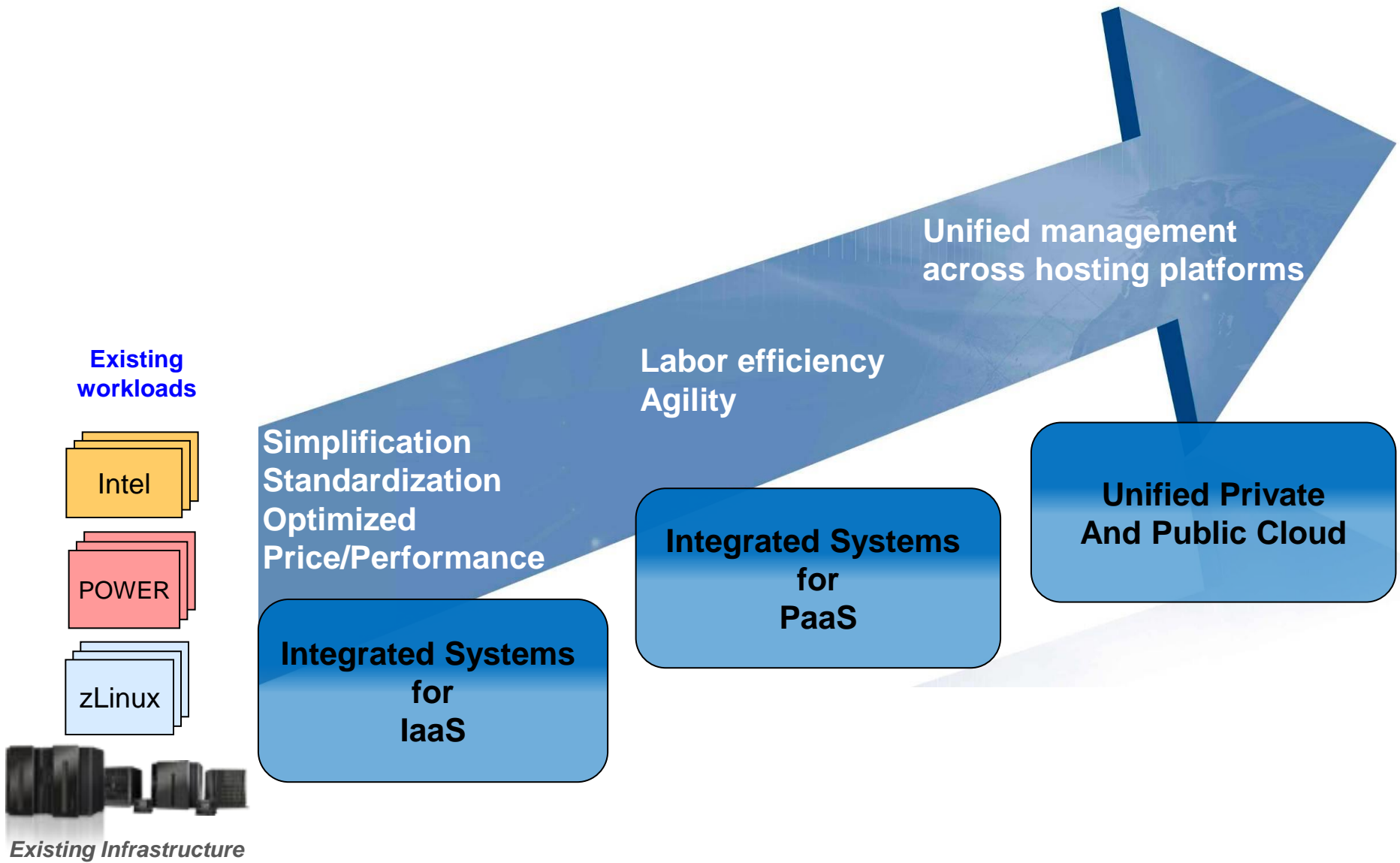
## ■ Limited Archiving

- ▶ Network performance and amount of data involved are limiting factors

# A Practical Cloud Strategy

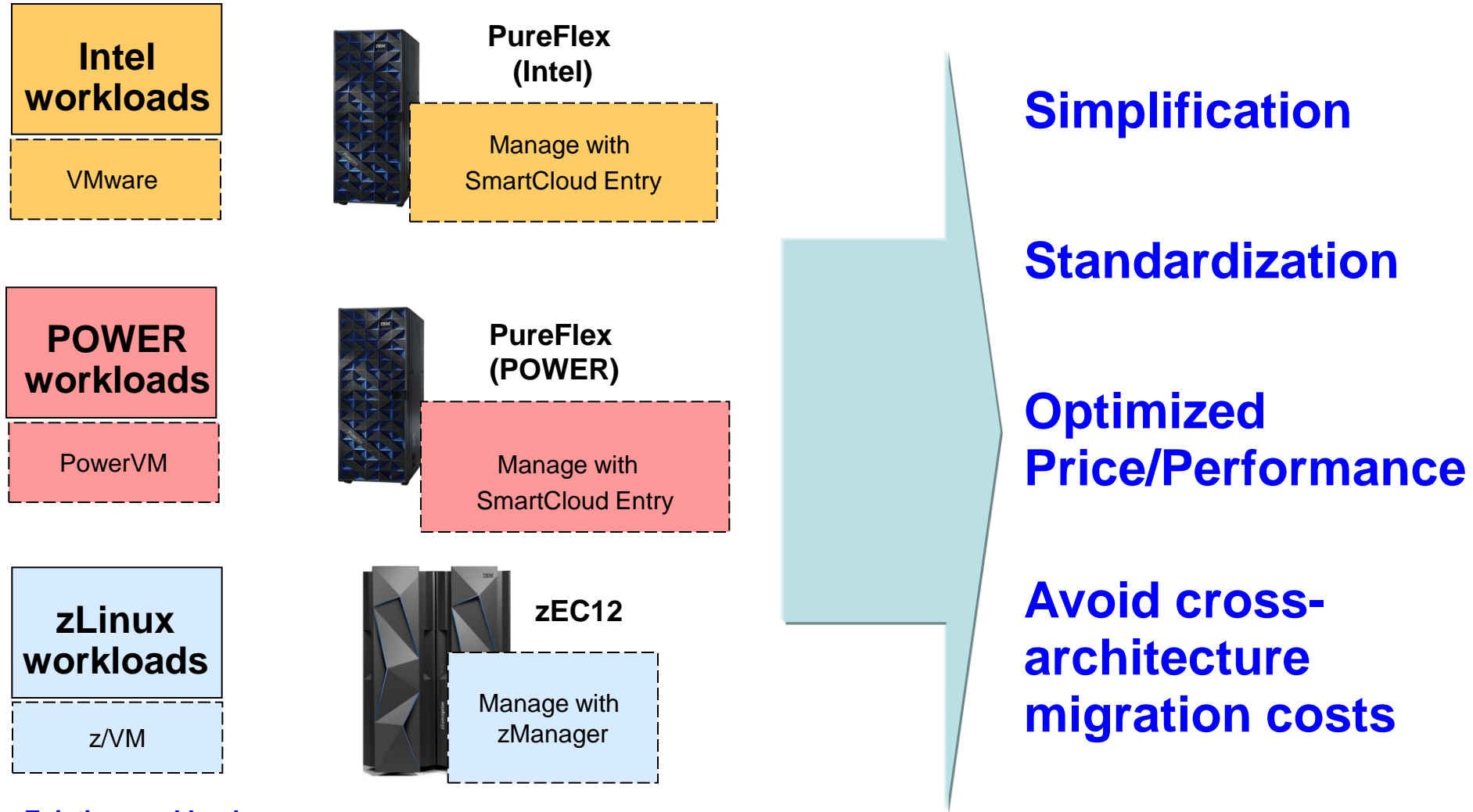
- Customers already have existing investments in images
  - ▶ Images typically on multiple platforms (x, p, z)
  
- A practical cloud strategy should try to preserve and re-use these assets
  - ▶ Migrating architectures is often costly and risky
  
- Assess best fit platform for workloads
  
- Focus on improving price/performance and improving labor

# A Step By Step Approach To Private Cloud With IBM





# Integrated Systems For IaaS – Benefits



Existing workloads and platforms

# PureFlex Delivers A **Simplified Experience** By Integrating Various Components

## Building Blocks: IBM Flex System™ components

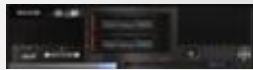
### Chassis

14 half-wide bays for nodes



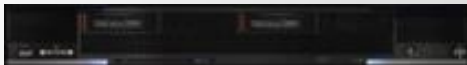
### Compute Nodes

Power 2S/4S  
x86 2S/4S



### Storage Node

V7000

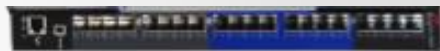


### Management Appliance



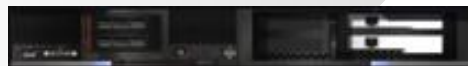
### Networking

10/40GbE,  
FCoE, IB  
8/16Gb FC



### Expansion

PCIe  
Storage



## PureFlex System

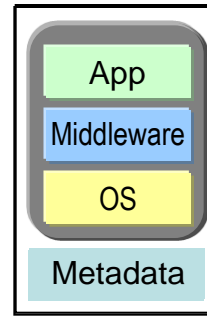


- Flexible choice
- Integrated design
- Pre-assembled hardware
- On-site set up services
- Faster time to value

**Build to Order**

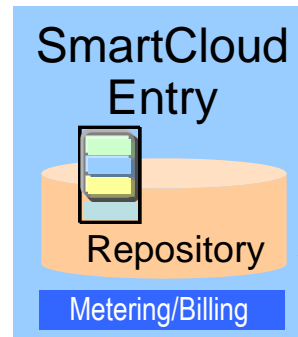
**Express, Standard and Enterprise Configurations**

# SmartCloud Entry On PureFlex Supports Cloud Management



*create virtual appliance (VM image)*

*store*



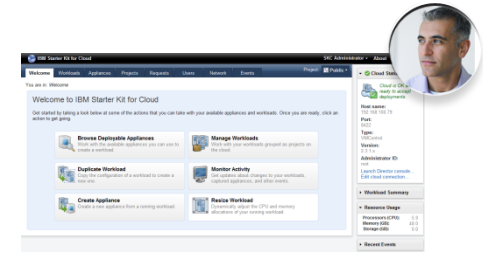
*monitor and manage cloud*

*request services*

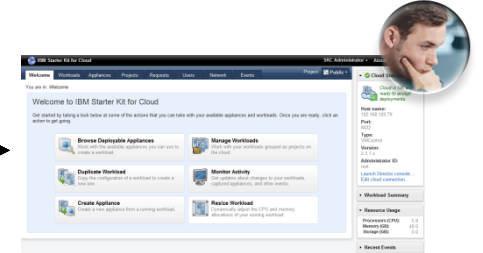
User Self-Service Portal UI



Admin



Admin



*deploy image*

*track usage*

*capture images*



Other Systems

SmartCloud Entry deploys workloads to either the x86 or Power compute nodes in PureFlex

# PureFlex System Offers More Flexibility And Choice





**IBM  
PureFlex™  
System**



**Coalition  
Competitor**

<b>Compute Nodes</b>	X86 (Sandy Bridge) or POWER7	X86 Westmere EP/EX and SandyBridge
<b>Network Protocols Node to Node</b>	1GbE/10GbE, FCoE, IB, 8/16 Gb FC Intra-Chassis communication	10 GbE, FCoE only Top-Of-Rack Switch
<b>Storage</b>	Integrated storage Storwize V7000 with Easy Tier	Integrated storage with FAST
<b>Workload support</b>	Native and virtualized	Virtualized with restricted native support
<b>Hypervisor support</b>	VMware, KVM, Hyper-V, PowerVM	VMware only
<b>HW Management</b>	Pre-installed, single point-of-entry	Multi-vendor integration via UIM
<b>Cloud Management</b>	IBM Smart Cloud Entry pre-loaded	vCloud Suite separate purchase and install
<b>Acquisition/ Upgrade options</b>	Build to order or Pre-defined starter configurations (Express/Standard/Enterprise)	Built-to-order with fixed upgrade increments

# PureFlex Has Higher Density For Less Money (Maximum Core Configuration)

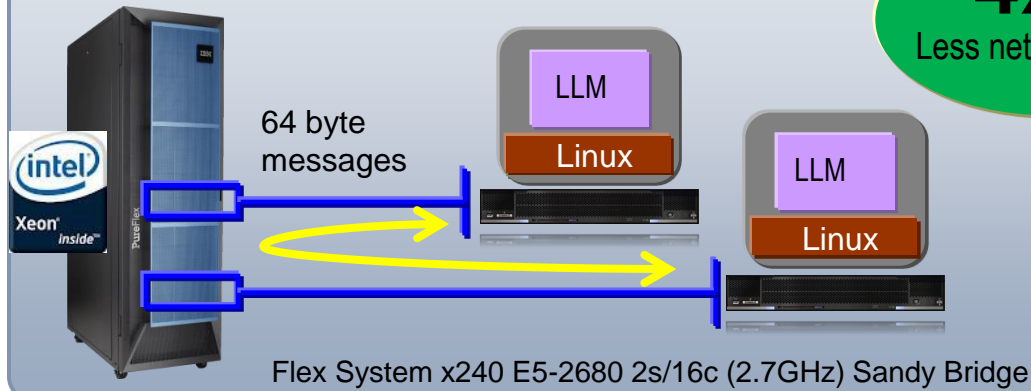
Fully Populated Rack	PureFlex (Intel) 	Coalition Competitor 
Hardware	\$1,151,360	\$1,462,886
System Software	\$224,490 <i>FSM, SmartCloud Entry, EasyTier</i>	Included <i>UIM, Vsphere Ent. Plus, FAST</i>
Services	\$72,210	\$173,506
<b>Total System Cost</b>	<b>\$1,448,060</b>	<b>\$1,636,392</b>
Number of Cores	656	256
<b>Cost Per Core</b>	<b>\$2,207</b>	<b>\$6,392</b>
Processor	Sandy Bridge: Romley-EP	Sandy Bridge: Romley-EP
RAM Memory	10.25 TB / 30.75 TB*	12 TB*
Networking	10GbE	10GbE
Storage capacity (raw)	39.2 TB HDD, 3.2 TB SSD	49 TB HDD, 0.9 TB SSD

Both systems based on maximum capacities in single full rack configuration, list prices and estimated services are for infrastructure set up only.

\* Maximum RAM using 32 GB DIMMs

# PureFlex Intra-Chassis Network Fabric Reduces Latency Between Blades

## PureFlex System (Intel)



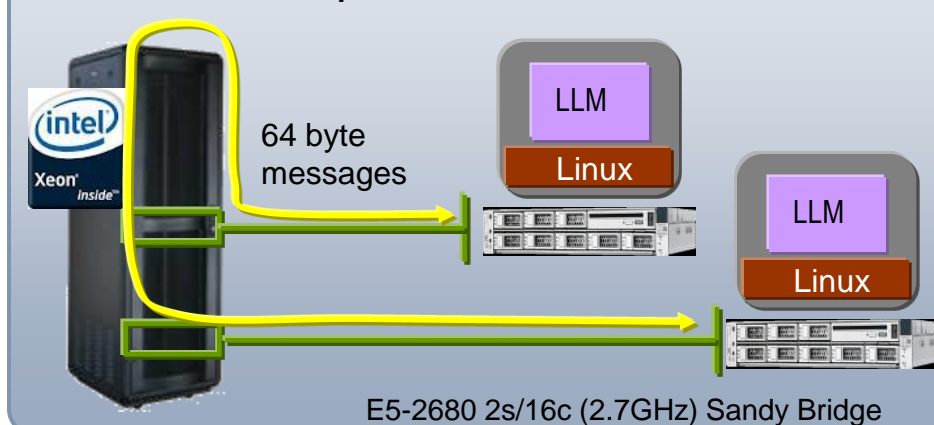
**4X**  
Less network latency

**27.5** Microseconds latency per message

**9.4** Microseconds latency due to network

**18,803** Messages per second

## Coalition Competitor



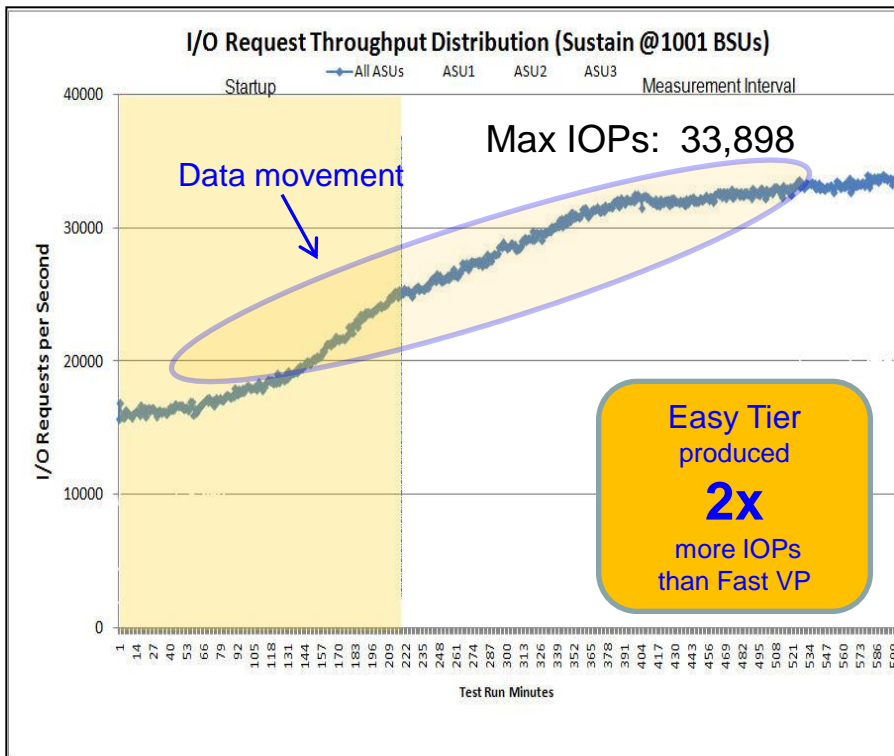
**63.0** Microseconds latency per message

**40.0** Microseconds latency due to network

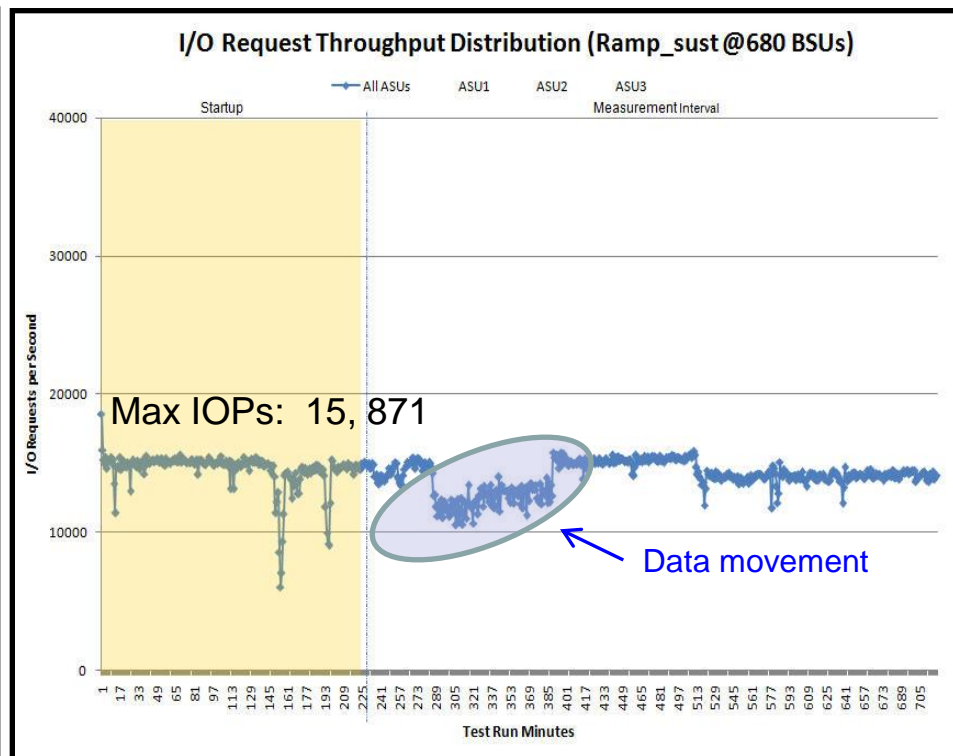
**7,920** Messages per second

# PureFlex (Intel) With Easy Tier Delivers 2x More IOPS To Applications

PureFlex on Intel – Storwize V7000 with Easy Tier (Native)



Coalition Competitor – VNX 5300 with FAST (Native)



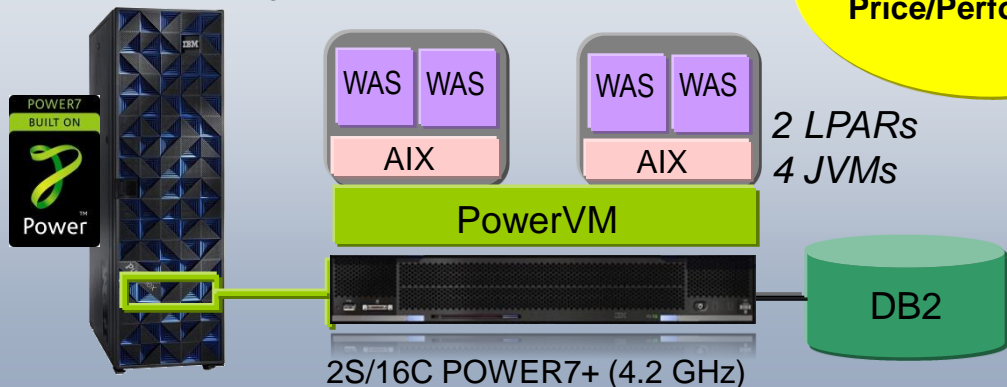
- Final sustained IOPS of: 33,898
- As Easy Tier learned the workload, performance increased and was sustained
- Storage use – 6 vdisks (4 x 1.86TB, 2 x 800 GB)

- Final sustained IOPS of: 15,871
- VNX/ Vblock shows a loss in performance as data movement commences
- Storage use – (5x100GB SSD, 15x600GB SSD, 20x2TB NL SAS)



# PureFlex POWER Workloads Can Achieve Better Price/Performance

## PureFlex System (Power)



**4.3X** Better  
Price/Performance

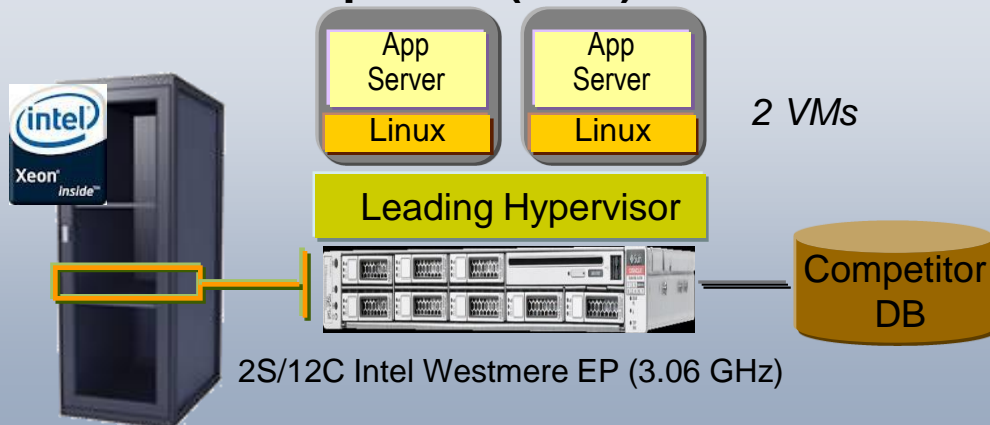
**64,192** User interactions per sec

**4,012** User interactions per sec per core

**\$4** Per user interaction per sec

WAS on platform  
Database off platform

## Coalition Competitor (Intel)



**16,344** User interactions per sec

**1,362** User interactions per sec per core

**\$17** Per User interaction per sec

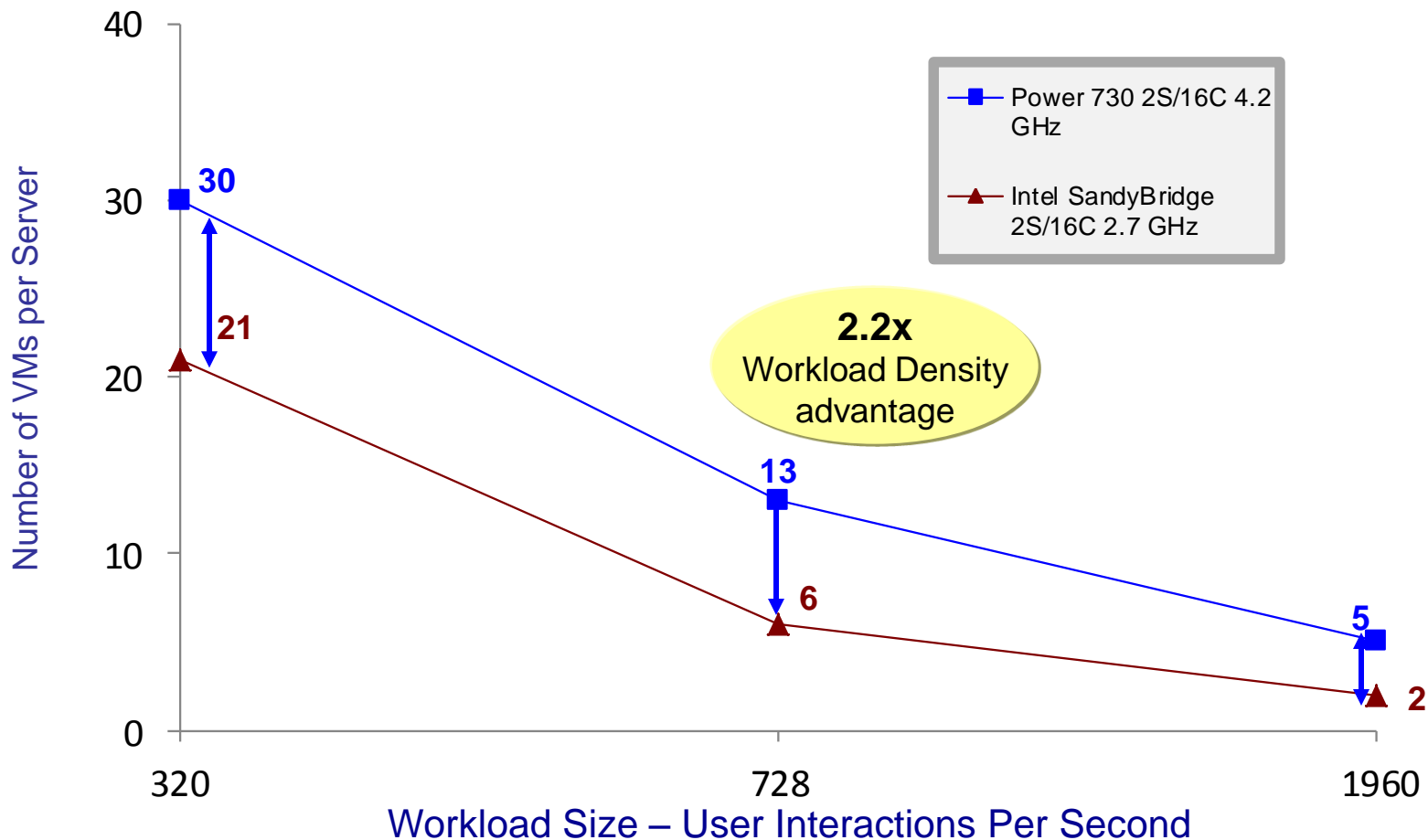
App Server on platform  
Database off platform

This is an IBM internal study of PureFlex System solution designed to replicate a typical IBM customer workload usage in the marketplace. The results were obtained under laboratory conditions, and not in an actual customer environment. IBM's internal workload studies are not benchmark applications, nor are they based on any benchmark standard. As such, customer applications, differences in the stack deployed, and other systems variations or testing conditions may produce different results and may vary based on actual configuration, applications, specific queries and other variables in a production environment. Prices, where applicable, are based on published US list prices for both IBM and competitor, and the cost calculation compares the cost per request for the 3yr life of the machine. 3 year total cost of acquisition comparisons are based on similar expected hardware, software, service & support offerings



# Run More Virtual Machine Workloads on PureFlex POWER

Web Front End Workloads (Online Banking v 3.6)  
Injection rates of 320, 728 and 1960 user interactions per second



This is an IBM internal study designed to replicate a typical IBM customer workload usage in the marketplace. The results were obtained under laboratory conditions, and not in an actual customer environment. IBM's internal workload studies are not benchmark applications, nor are they based on any benchmark standard. As such, customer applications, differences in the stack deployed, and other systems variations or testing conditions may produce different results and may vary based on actual configuration, applications, specific queries and other variables in a production environment.

# More Virtual Machine Workloads Yield A Lower Cost Per Workload

## PowerVM / Power 730 (POWER 7+)

WAS  
8.5



2 Socket /16 Core POWER7+  
(4.2 GHz)

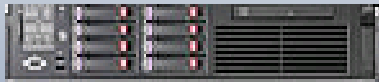
Online Banking Workloads v3.6 each running  
728 User Interactions / Sec

13 workloads  
\$22,595 per Workload

62%  
lower cost

## HP - ProLiant DL380p Gen8 (Sandy Bridge) and Competitor Hypervisor

Leading  
App Srvr

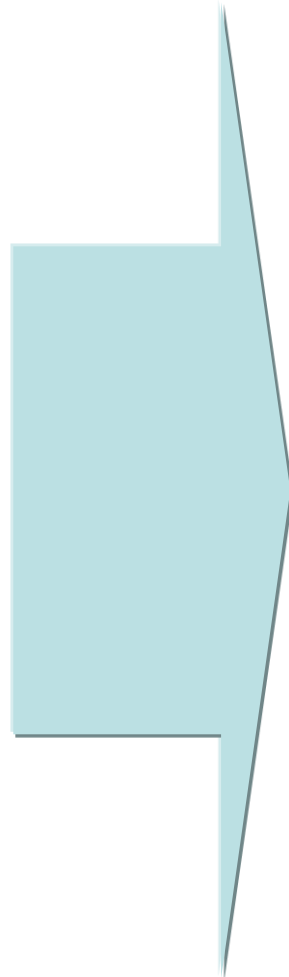
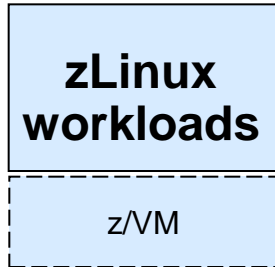
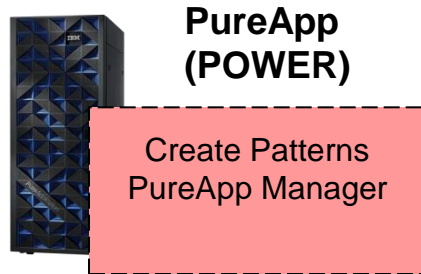
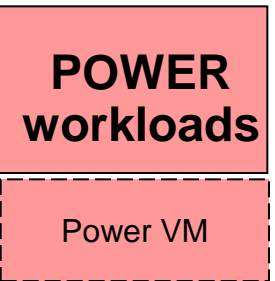
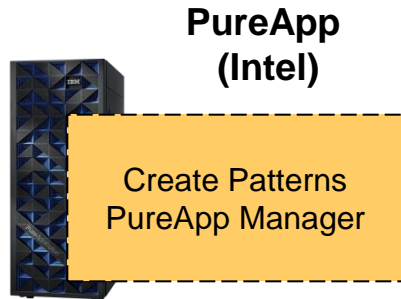
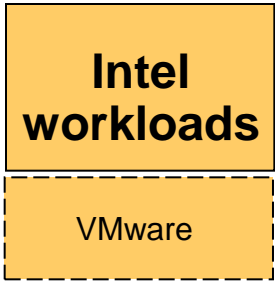


2 Socket /16 Core Intel Sandy Bridge  
(2.7 GHz)

6 workloads  
\$59,232 per Workload

Source: IBM CPO internal studies

# Integrated Systems For PaaS – Benefits



**More Labor Efficiency with pattern deployments**

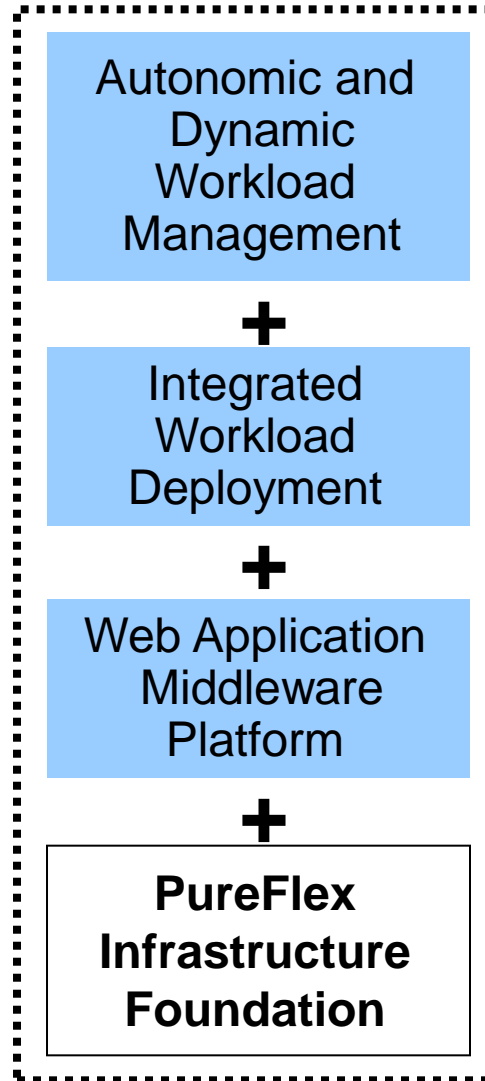
**More Agility with automatic load balancing and scaling**

**Existing workloads and platforms**

# IBM PureApplication System Adds Built In Expertise To Improve Labor Efficiency



**IBM PureApplication System**



*Built-in workload elasticity using pre-defined scaling policies*

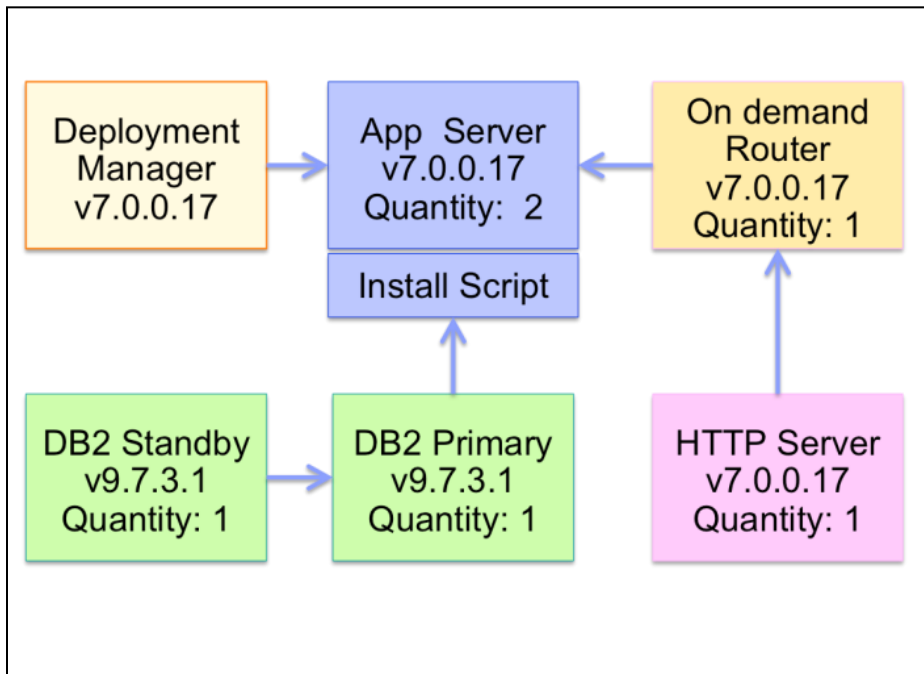
*Built-in expertise via web workload patterns; Self-service, automated provisioning of workloads*

*Pre-entitled licenses included*

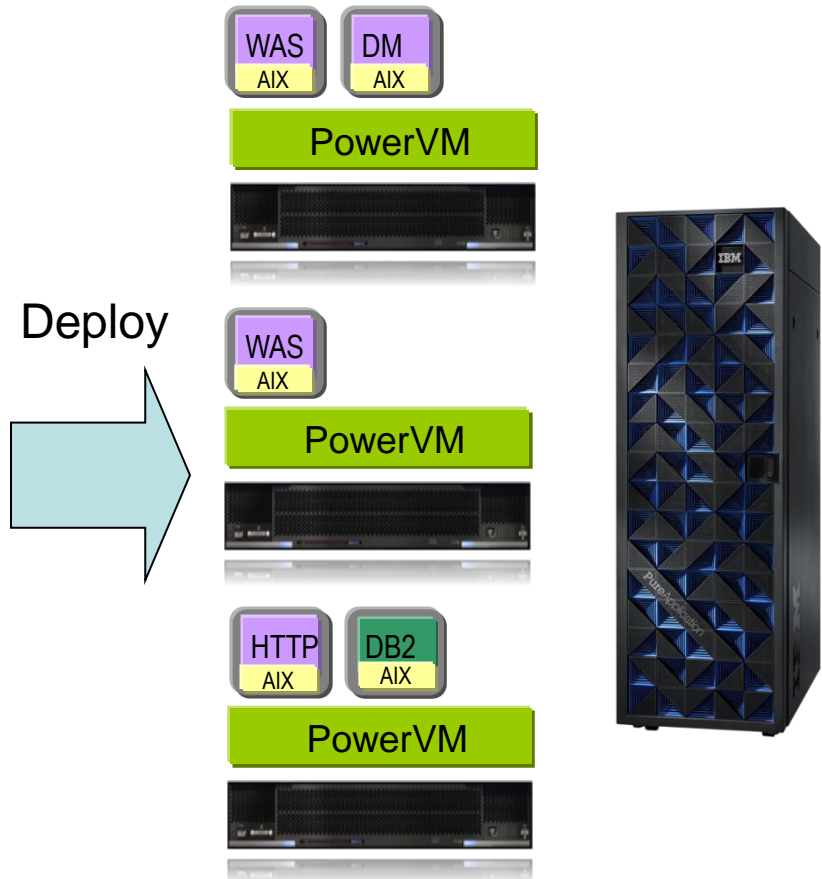
*Compute + Network + Storage + FSM Management*

# Virtual System Patterns Speed Up Workload Deployment

## Select Virtual System Pattern



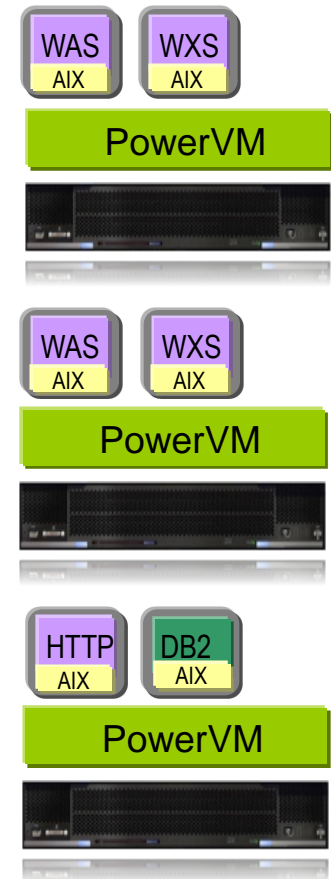
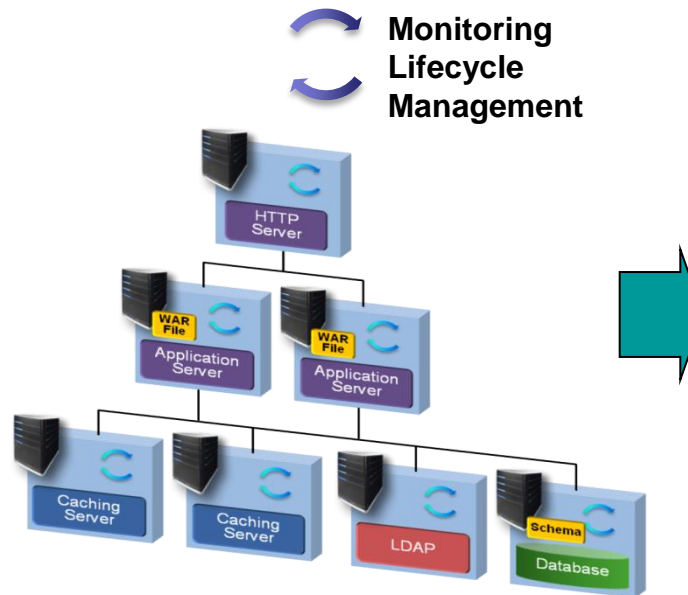
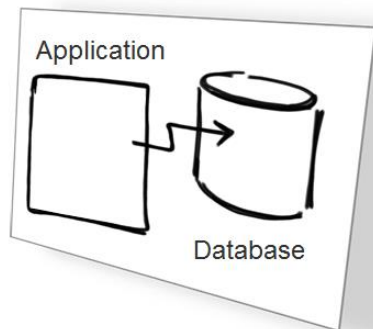
Describes virtual machines, network connections, software stacks and configurations



PureApplication Manager deploys virtual machine images

# Virtual Application Patterns Further Simplify Deployment

*What the business wants...*



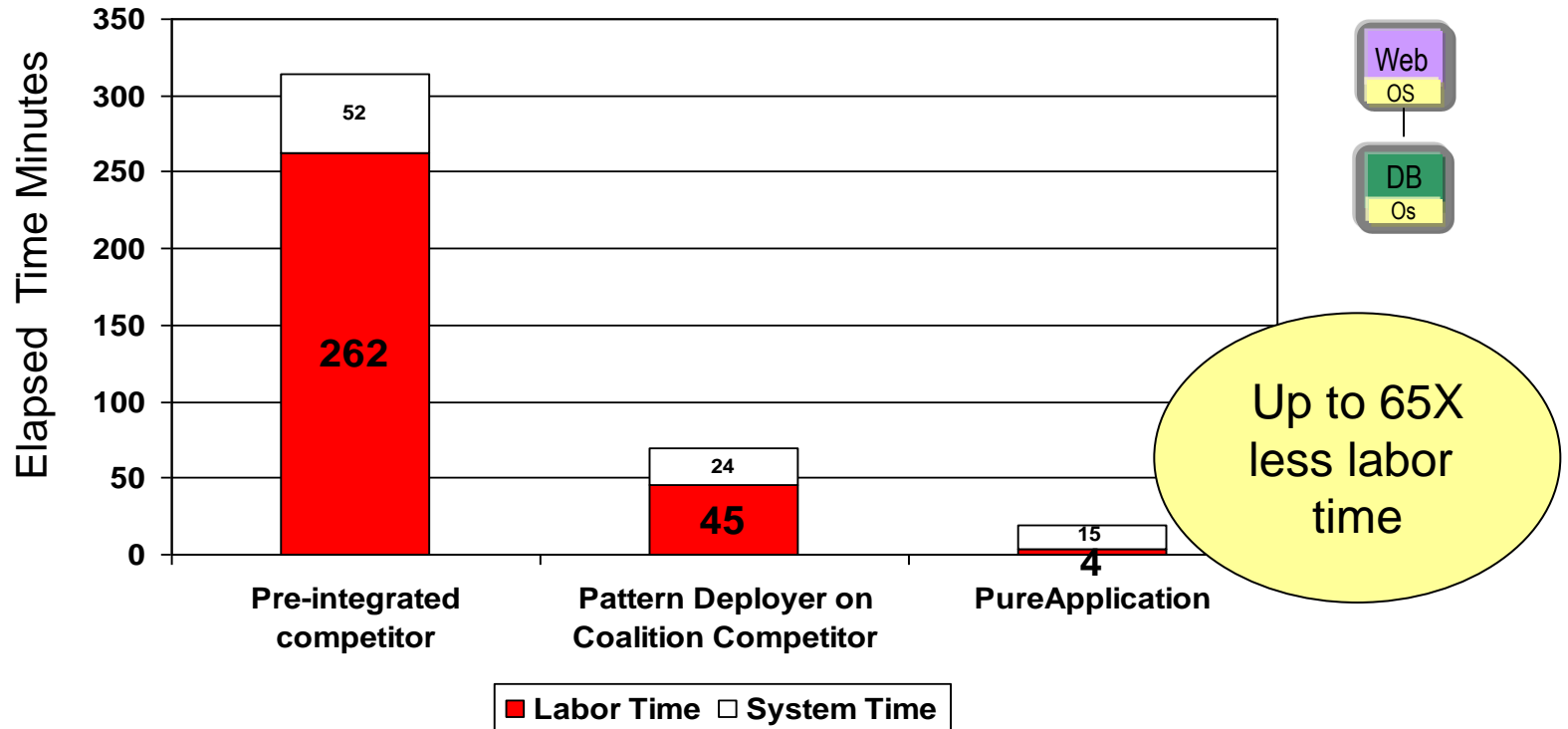
Virtual Application Pattern

Just provide application code, DDL, and specify policies

PureApplication Manager constructs and deploys this pattern

# Patterns Significantly Speed Deployment of Web Applications

Elapsed Time to Create and Deploy a Single Web+DB Workload



PureApplication deployment using virtual application pattern

Pre-integrated competitor deployment assumes first creating templates for the application server and database images

Coalition competitor deployment using pattern deployer tool to deploy application server and database components

IBM internal study of effort needed for 1 FTE to install, setup and deploy an online trade application consisting of an application server and database component. Hardware: IBM PureApplication System (using 1 of 6 blades (16 Intel cores used) compared to a pre-integrated competitor's configuration (Intel Westmere EP 12-cores @ 2.93 GHz, virtualized system offering) and coalition competitor (Intel SandyBridge 16-cores @ 2.7 GHz, virtualized system offering) in a controlled laboratory environment. IBM software is based on using the Virtual Application Web App Pattern. Pre-integrated Competitor's software is based on using competitor Linux template, application server and database in a virtualized environment. Coalition competitor software is based on competitor application server and database installed in virtualized environment using competitor automated pattern deployment software. No performance testing was done; this is not a benchmark study. Customer applications, differences in the stack deployed, and other systems variations or testing conditions may produce different results and may vary based on actual configuration, applications, and other variables in a production environment. Private Cloud Options should verify the applicable data for their environment.



# Constructed Web Application Pattern Includes Run Time Management Functions

**Full Functions** Proxy service, Web cluster with failover, database, data grid, external connections

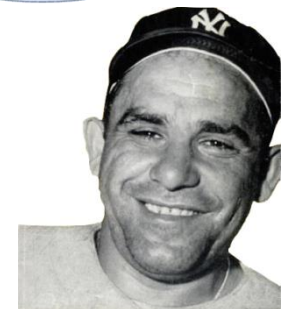
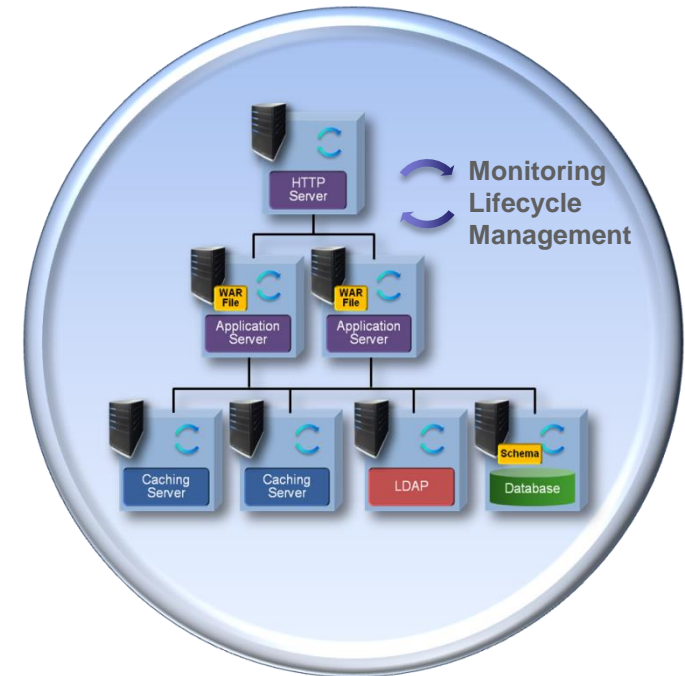
**Load Balancing** Web requests are automatically load balanced across multiple virtual application servers

**Monitoring** All components of virtual application environments are monitored by PureApplication System

**Auto Scaling** Managed environments scale up and down based upon business policies you specify

**Resiliency** Failed virtual machines are replaced with new VMs which are configured with the old VM's identity

**Security** ACL's for application sharing and management access; LDAP integration for application security





# Complete Solution Based Patterns Of Expertise That Are Available On PureApplication System



## Web and SOA Applications

- \* **IBM Web Application Pattern**
- \* **IBM WebSphere Application Server Hypervisor Edition for RHEL**
- IBM Web Experience Patterns for **WebSphere Portal Server** for Red Hat Enterprise Linux
- IBM Web Experience Patterns for **Web Content Manager** for Red Hat Enterprise Linux
- IBM **SOA Policy** Pattern
- IBM **SOA Policy Gateway** Pattern for Red Hat

## Connecting Your World

- IBM **Connections** Hypervisor Edition
- IBM **WebSphere Message Broker** Hypervisor Edition for Red Hat Enterprise Linux Server
- **WebSphere MQ** Hypervisor Edition V7.5 for Red Hat Enterprise Linux
- IBM **Messaging Extension** for Web Application Pattern
- IBM **WebSphere Transformation Extender** with Launcher Hypervisor Edition
- IBM PureApplication System virtual application for **SAP CRM**

## Processes and Decisions

- IBM **BPM** Pattern (Process Center Hypervisor Edition on RHEL)
- IBM **BPM** Pattern (Process Server Hypervisor Edition on RHEL)
- IBM **Operational Decision Manager** Pattern (Decision Center Hypervisor Edition on RHEL)
- IBM **Operational Decision Manager** Pattern (Decision Server Hypervisor Edition on RHEL)

## Business Intelligence and Analytics

- IBM Business Intelligence Pattern (**Cognos**)
- IBM **InfoSphere Information Server** for production
- IBM **InfoSphere Information Server** for non production environments

## Data and Transactions

- \* IBM **DB2** Enterprise Server Edition
- \* IBM **Transactional Database** Pattern
- \* IBM **Data Mart** Pattern
- IBM **Informix** Hypervisor Edition

\* Pre-loaded in PureApplication catalog and entitled for full capacity of system

# Pre-Built Patterns Available From IBM And A Broad Ecosystem of Partners



Over **206** optimized solutions  
from **170** leading ISV partners

PureSystems Centre is the gateway to IBM and certified partner expertise  
[ibm.com/puresystems/centre](http://ibm.com/puresystems/centre)

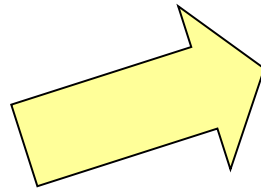
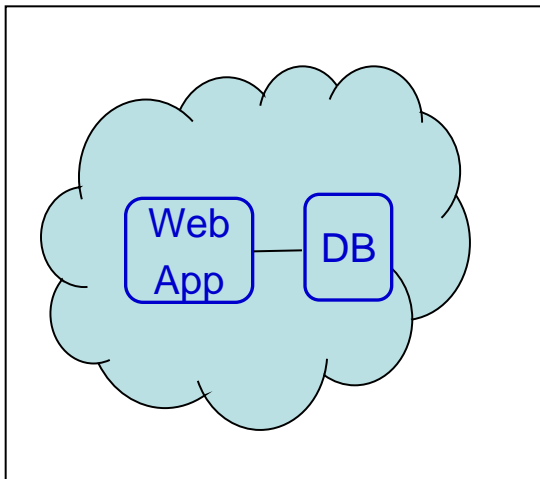
- **developerWorks** enables the developer ecosystem  
[ibm.com/developerworks/puresystems](http://ibm.com/developerworks/puresystems)



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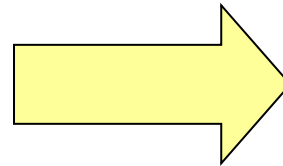
# Now Compare The Labor Costs To Manage 72 Web-Facing Workloads

72 Web-facing Workloads



9 blades, 144 cores

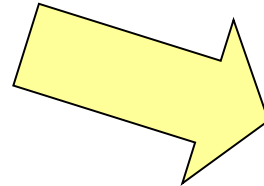
**Do-It-Yourself (DIY)**



1/4 Rack Web  
(6 nodes used)

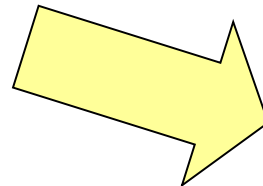
Full Rack Data + 1/2 Rack Data  
(8 nodes + 4 nodes)

**Pre-integrated Web Competitor**  
**Pre-integrated Database Competitor**



12 blades, 192 cores  
(9 blades used)

**Coalition Competitor**

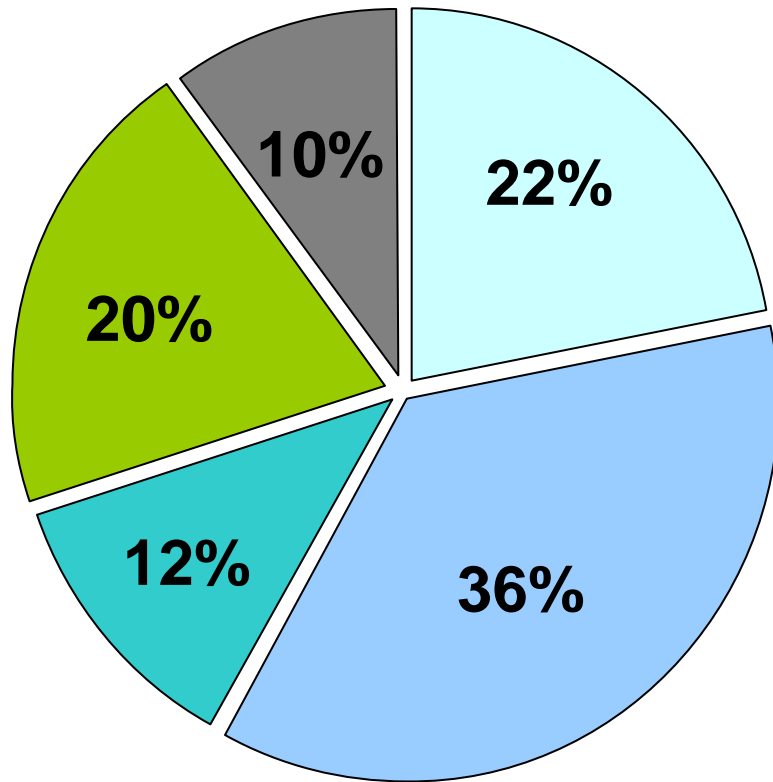


PureApplication  
System - Small  
(3 nodes, 96 cores)

**PureApplication on Power**

***Which option requires the least labor?***

# Five Key IT Management Processes Impacted By PureApplication System



Typical percentage of time administrators spend on each task category

Allocation based on customer data from IBM study

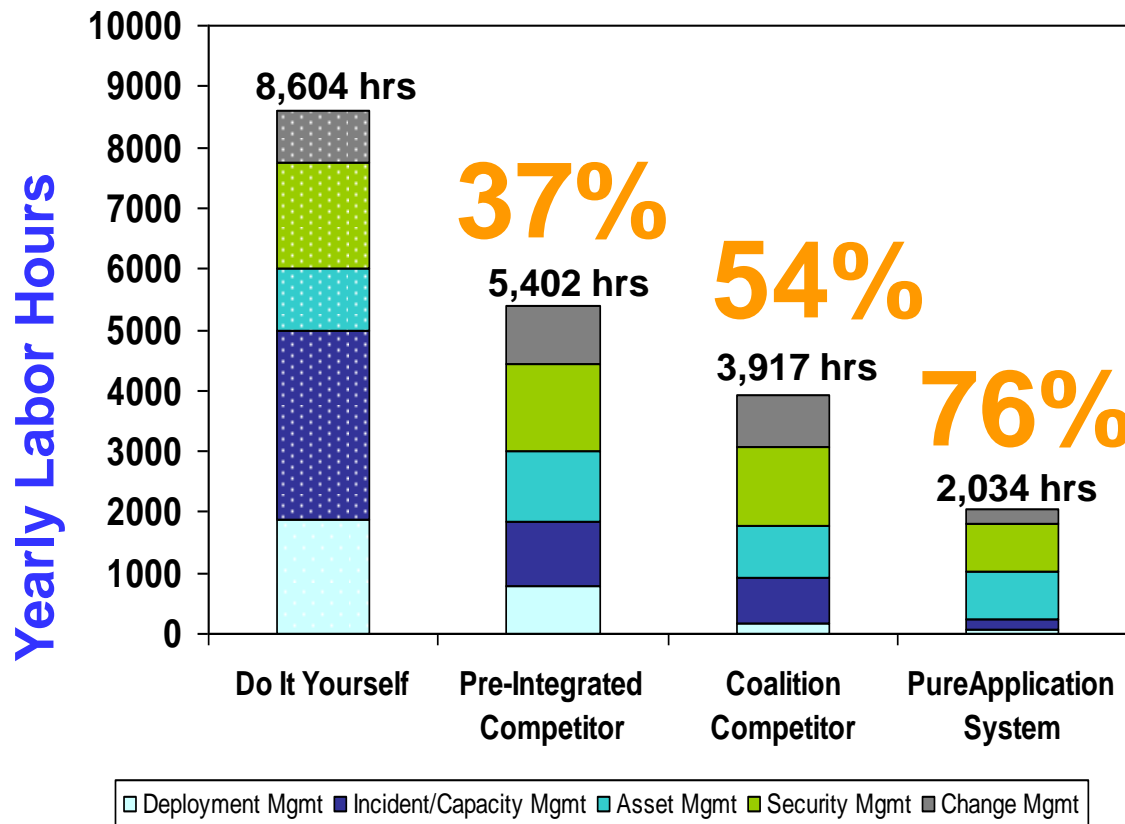
- Deployment Management**  
– Hardware set-up and software deployment
- Incident/Capacity Management**  
– Monitor and respond automatically
- Asset Management**  
– Hardware and software asset tracking
- Security Management**  
– Access control
- Change Management**  
– Hardware and software changes

ITIL = Information Technology Infrastructure Library

# IBM PureApplication System Optimized To Reduce Labor Costs



## Case Study With 72 Workloads



Note: Do It yourself used 9 blades (144 cores). Coalition competitor used 9 competitor blades (144 cores). Pre-Integrated competitor used 18 pre-integrated nodes (288 cores). IBM PureApplication System used 3 nodes (96 cores). Each system has the capacity to run 72 workloads where each workload can sustain a peak throughput of 1718 page elements per second.

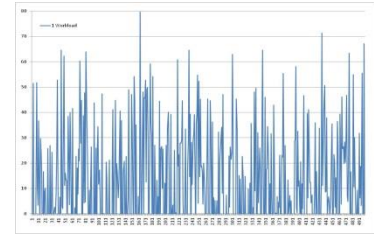
## PureApplication Contributors to Labor Savings

- **Deployment**
  - ▶ Fully assembled and configured
  - ▶ Pre-installed management software
  - ▶ Fast pattern-based deployment
- **Incident/capacity**
  - ▶ Centrally monitor and resolve issues with automatic scaling
- **Asset**
  - ▶ Track license usage of products
- **Security**
  - ▶ Centralized access control
- **Change**
  - ▶ Visibility into relationships of virtual images in a workload
  - ▶ Automatically apply changes to desired virtual servers

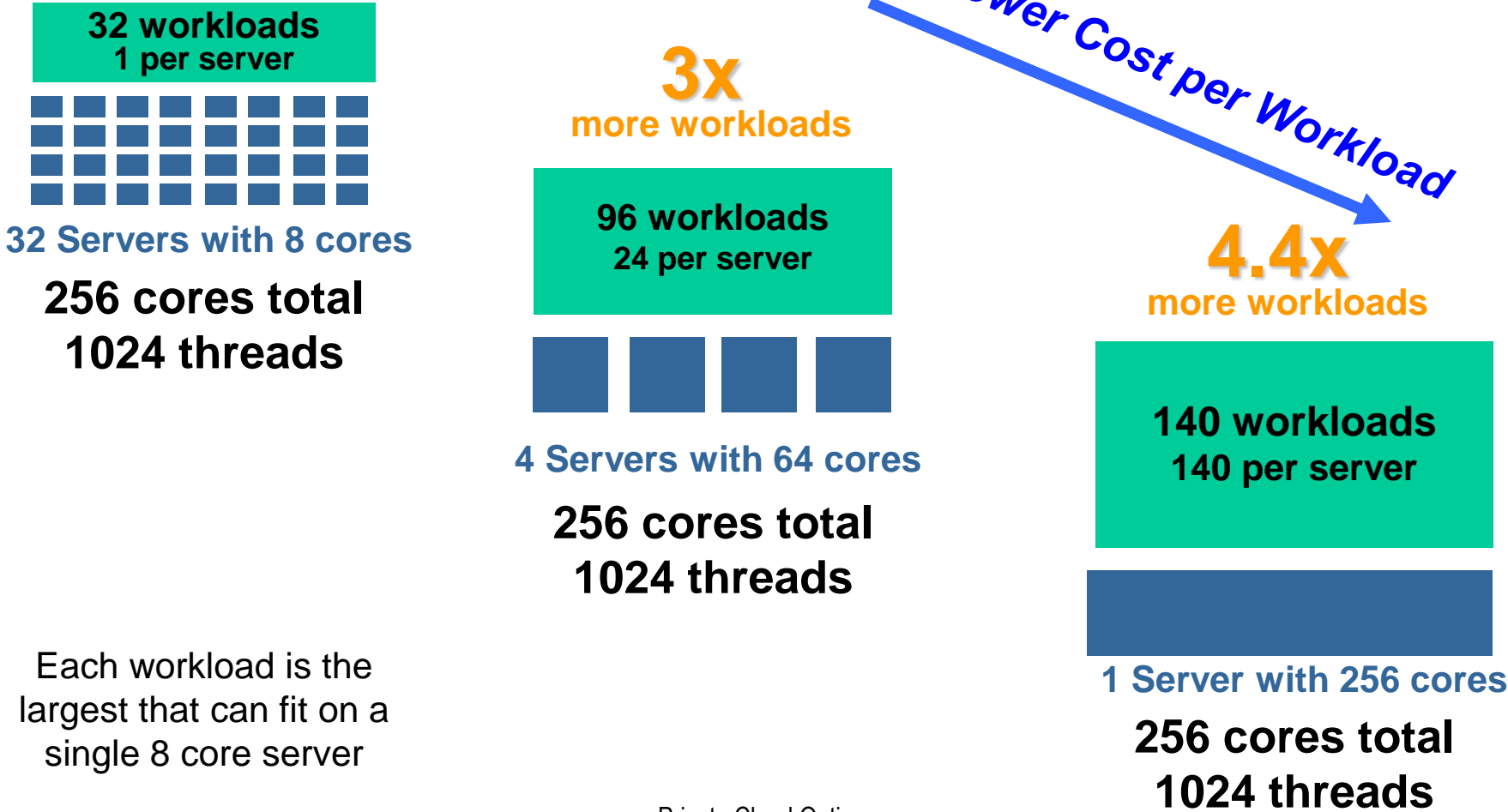
This is an IBM internal estimated labor study based on modeling customer data on IBM hardware and software solutions and on competitor converged solutions designed to replicate typical IBM customer usage in the marketplace. It is not a benchmark. As such, customer applications, differences in stack deployed and other systems variations may produce different results and may vary based on actual configuration, applications, specific queries and other variables in a production environment based on published standard labor rates for IT staff.

# Larger Servers With More Resources Make More Effective Virtualization Platforms

- Most workloads experience variability in demand
- When you consolidate workloads with variability on a virtualized server, the variability of the sum is less (statistical multiplexing)
- The more workloads you can consolidate, the smaller is the variability of the sum
- Consequently, bigger servers with capacity to run more workloads can be driven to higher average utilization levels without violating service level agreements, thereby reducing the cost per workload



# A Single High End Server Can Run More VMs Than Several Smaller Servers

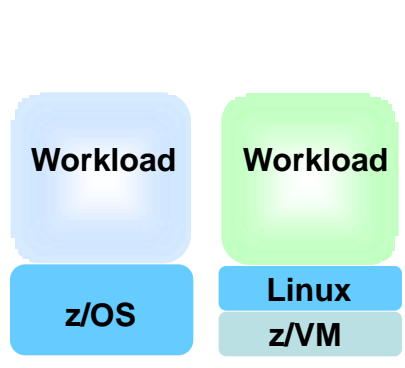
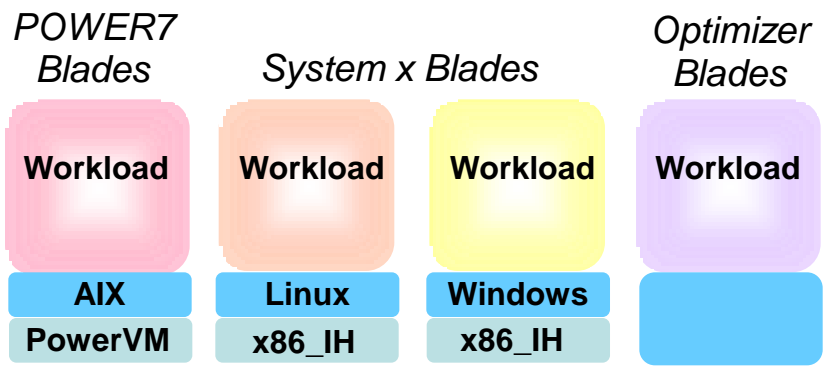




# zEnterprise Provides Multi-Architectural Support For Workloads With z Affinity



Use a Best Fit Strategy for Workload Assignment



zEnterprise BladeCenter Extension (zBX)

zEC 12

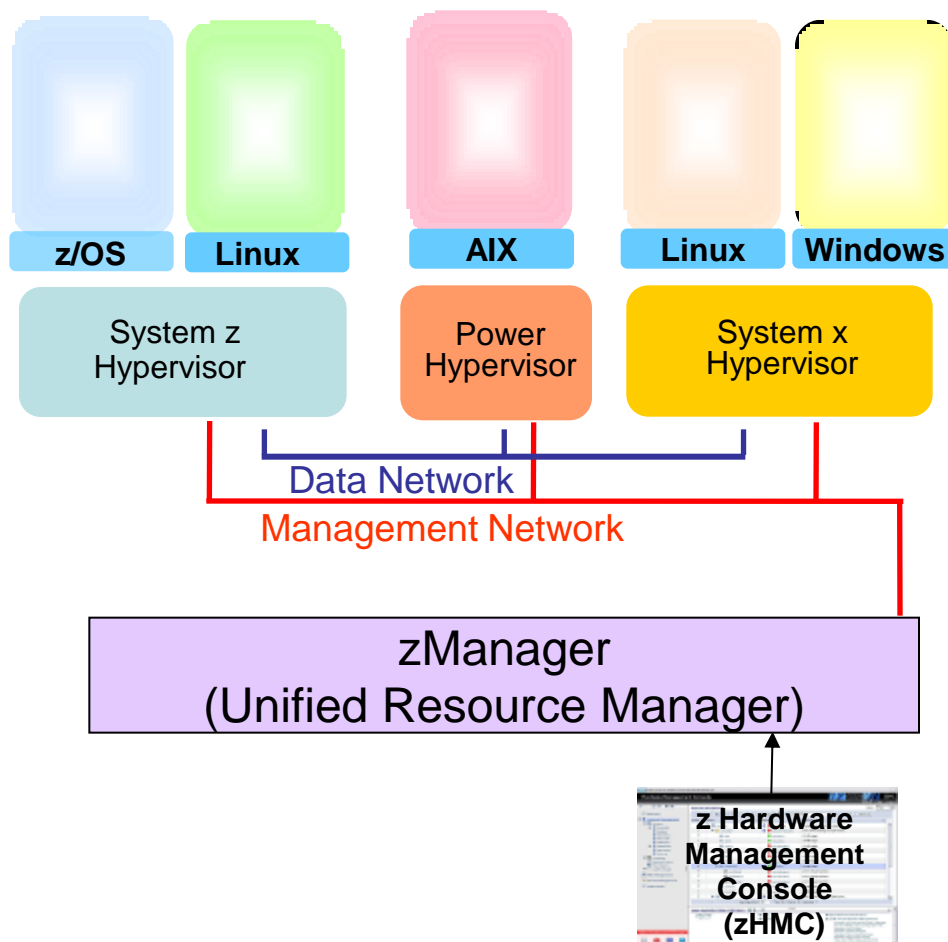
IBM DB2 Analytics Accelerator



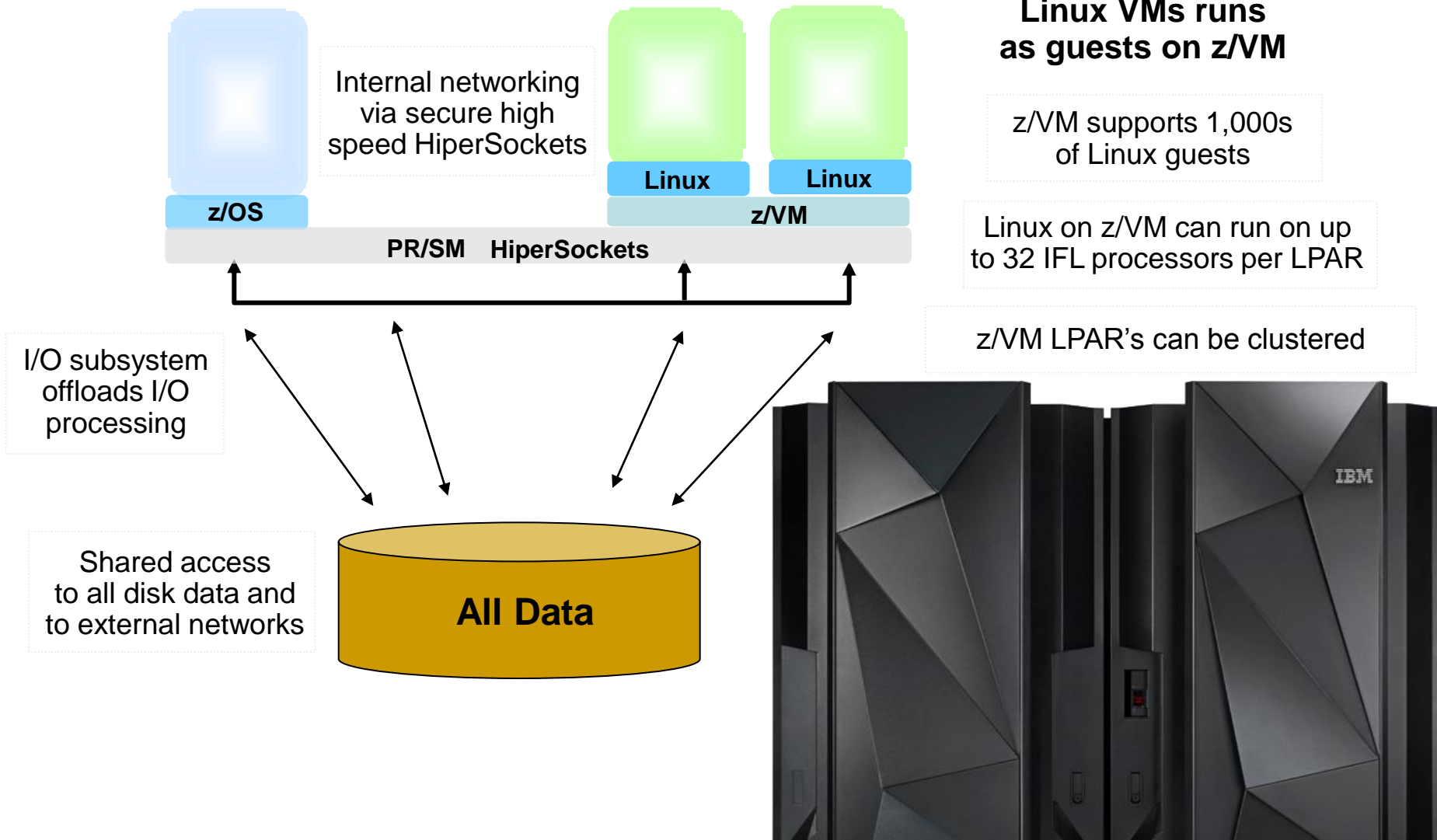


# zManager Provides Consistent Structured Management For All Virtual Environments

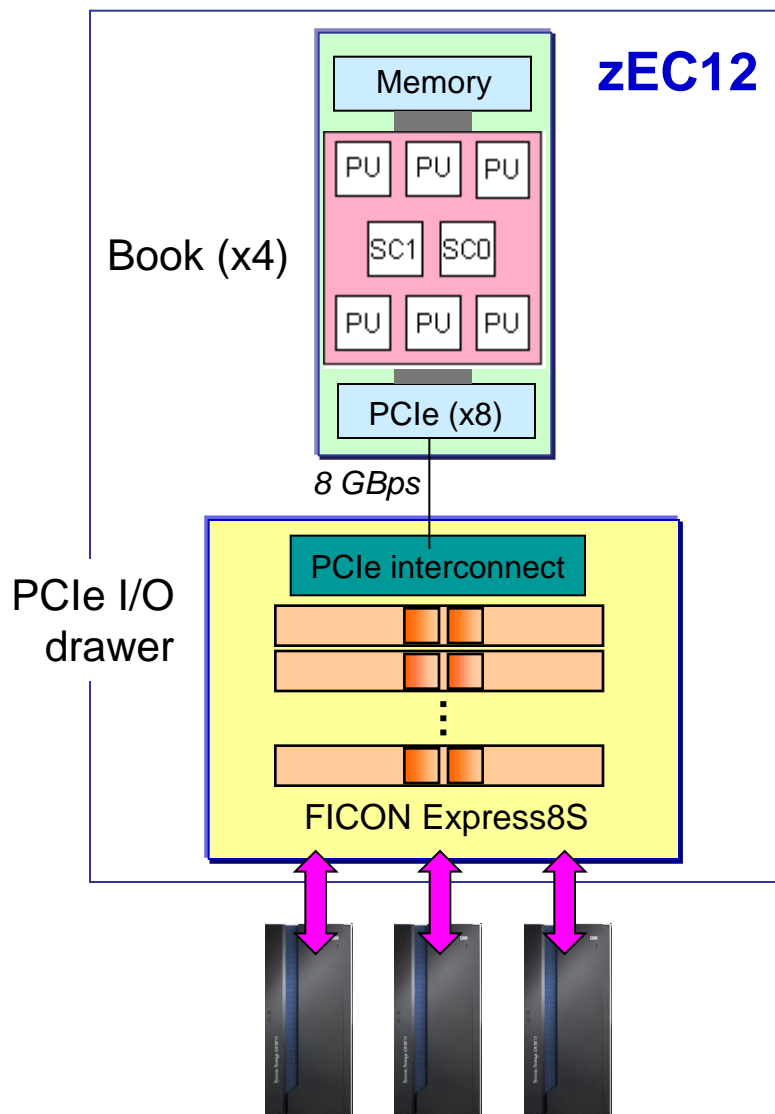
- Manage machine resources from a single focal point
  - ▶ Add processors while running
  - ▶ Add and configure a zBX blade while running
  - ▶ Create virtual machines and networks quickly
  - ▶ Runs in service element
- Manage full virtual machine lifecycle
  - ▶ Create, monitor, optimize, destroy
- Includes automated functions to reduce time and labor



# A Closer Look At z/VM and Linux



# Linux On z/VM Workloads Get The Benefit Of System z Dedicated I/O Subsystem



- Specialty processors handle all I/O requests – System Assist Processors (SAPs)
  - ▶ Schedules I/O operation, checks for availability of I/O path, provides queue mechanism, prioritize I/O
  - ▶ Max of 16 SAPs can sustain up to 2.4M IOPS\*
  - ▶ I/O subsystem bus speed = 8 GBps
- Up to 160 physical FICON cards for I/O transfers
  - ▶ Up to 320 RISC processors (2 per card)
  - ▶ Up to 320 FICON channels (2 per card)
  - ▶ 8 Gbps per link, 288 GB/Sec I/O aggregate per zEC12
- IBM DS8800 Storage System
  - ▶ Up to 440K IOPS capability

\* Recommend 70% max utilization – 1.7M IOPS  
Numbers represent High Performance FICON traffic

# Linux On z/VM Workloads Inherit System z Qualities Of Service

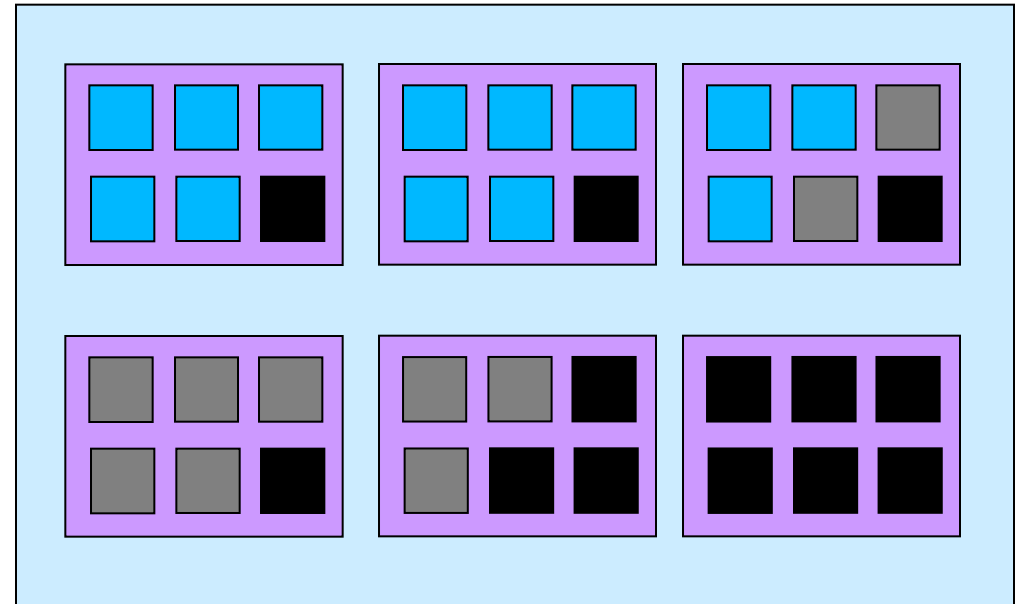
- Add processing capacity to Linux environment without disruption
- Capacity on demand upgrades
- Reliability, availability, serviceability
- Site failover for disaster recovery



# System z Capacity On Demand Provides Extra Processors To Handle Unexpected Peaks

- Capacity on Demand
  - ▶ “Books” are shipped fully populated
  - ▶ Activate dormant processors as needed
  - ▶ Use for temporary or permanent capacity
  - ▶ Self-managed on/off
- New capacity is immediately available for work without service disruption

One Book with 36 Processors



Active processors – pay full price



Inactive processors (On/Off CoD) – pay only 2% of full price



Dark processors (unused) – no charge

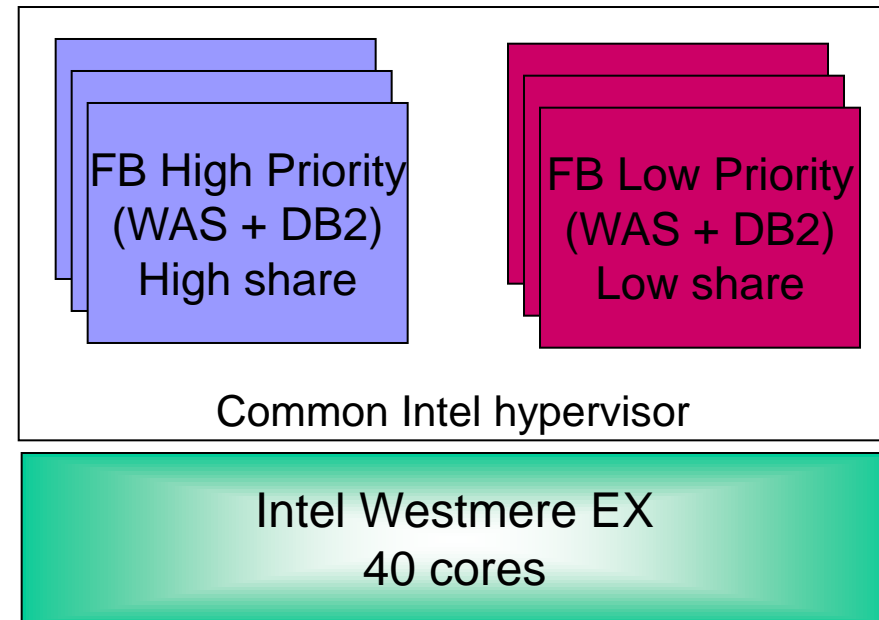
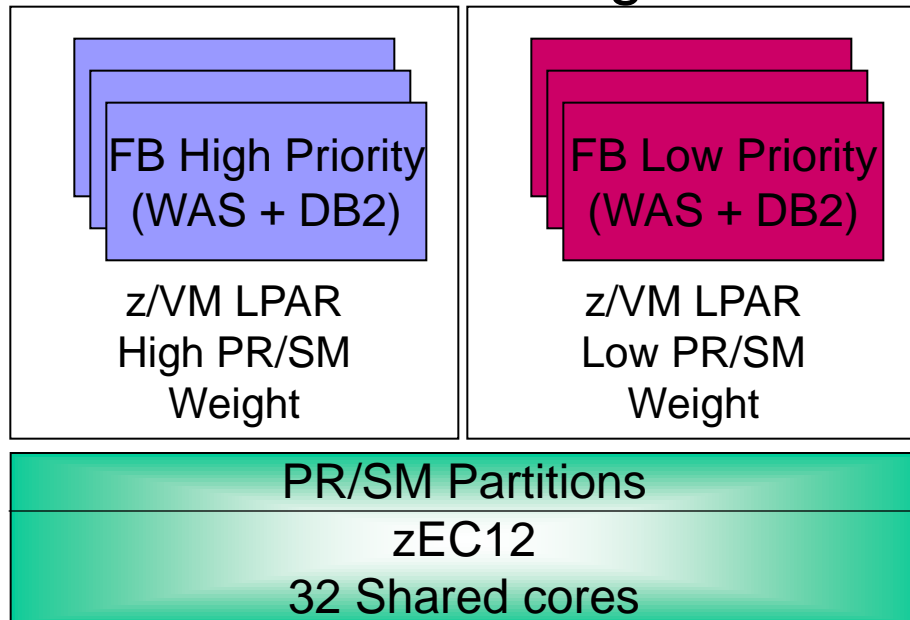
# Workload Management In A Private Cloud Environment

- Hosting platforms must be able to support high priority and low priority workloads together when sharing resources
  - ▶ Enables maximum utilization of the hosting platform
  
- Particularly relevant in a Private cloud environment
  - ▶ Multiple tenants with different priorities
  
- Desired behavior when mixing workloads
  - ▶ Low priority workloads “give up” resources to high priority workloads when required, soak up unused resources when available
  - ▶ High priority workload performance must not degrade

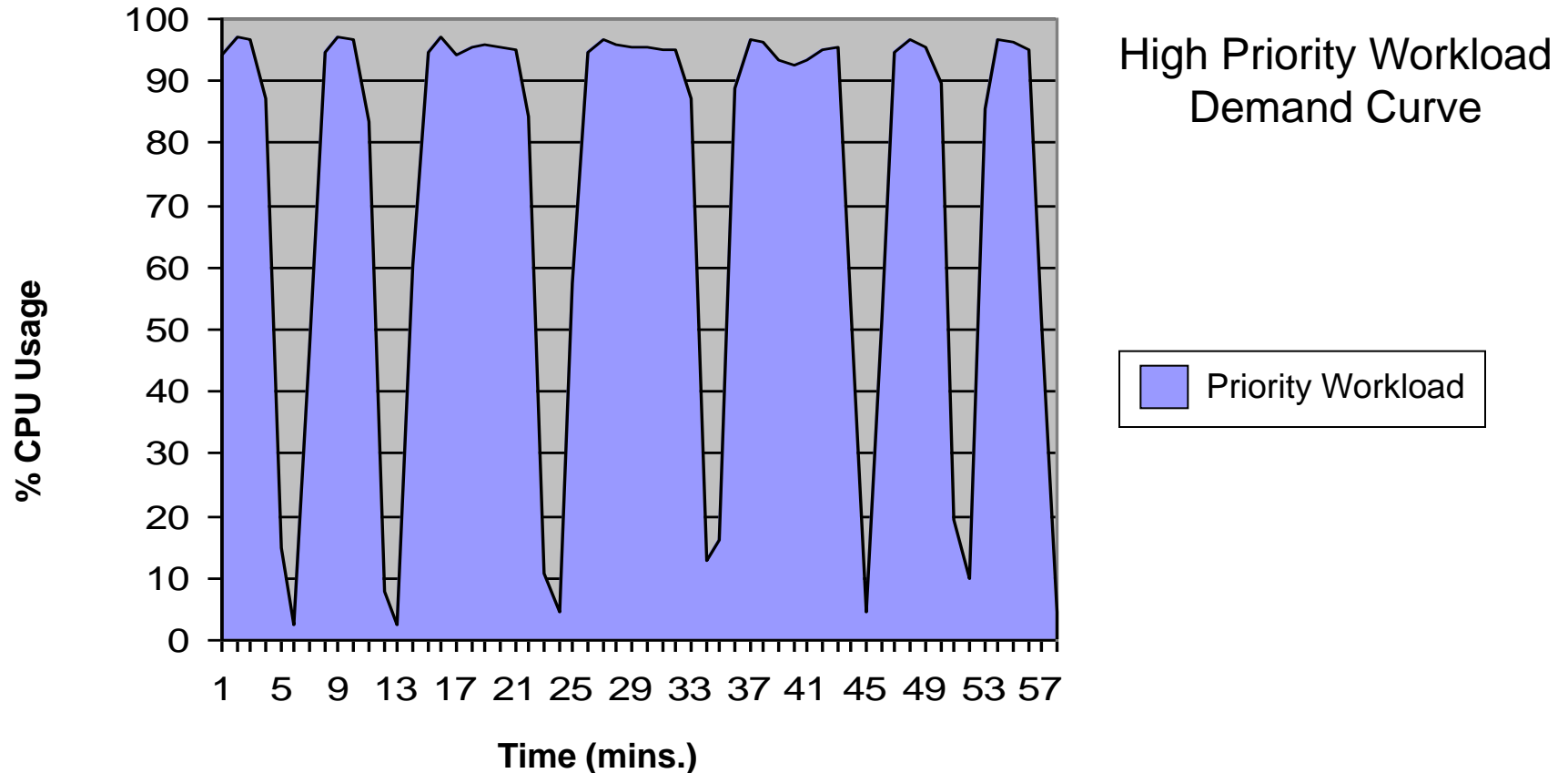
# Comparison of System z PR/SM To Intel Common Virtualization Environments

- High Priority web workload has defined demand over time
- SLA requires that response time does not degrade

- Low Priority web workload has unlimited demand
- It “soaks up” unused CPU minutes



# Priority Workload With Varying Demand Running Standalone On System z PR/SM



### Capacity Used

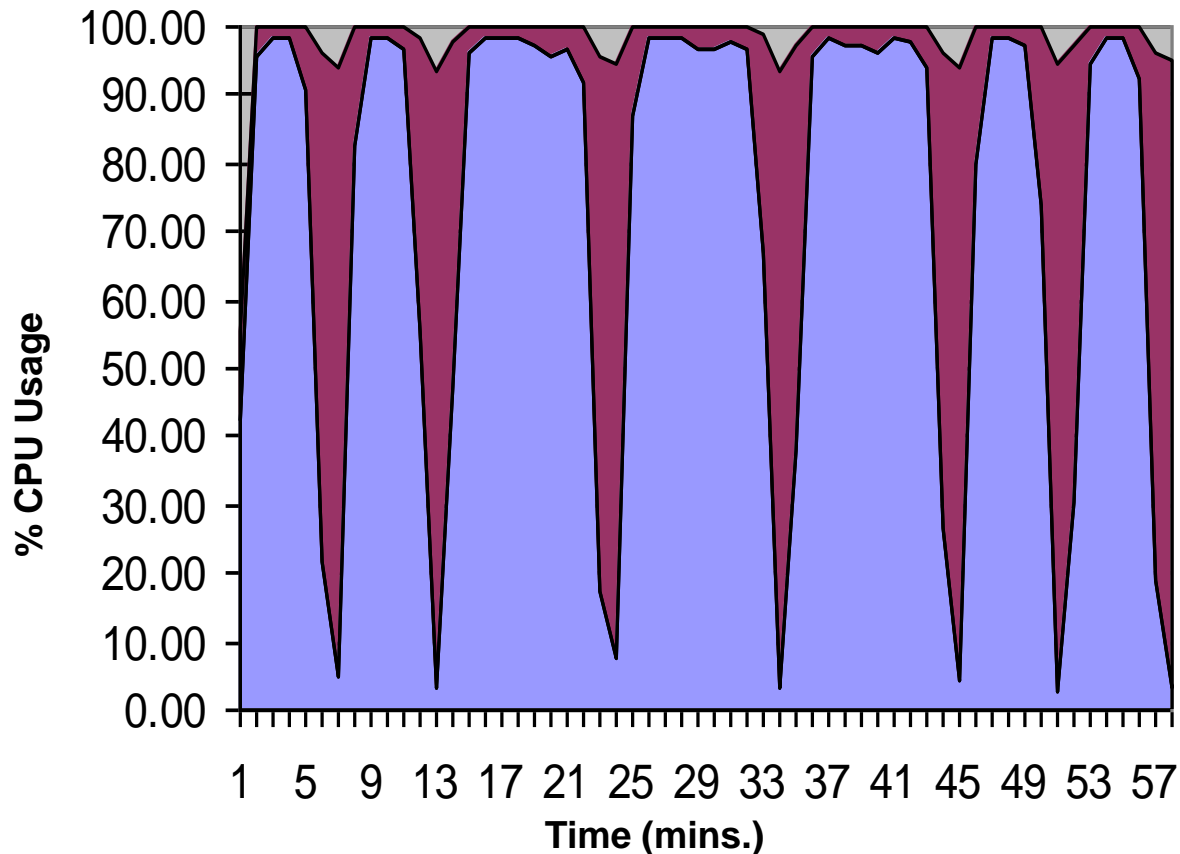
High Priority - 72.2% CPU Minutes  
Unused (wasted) - 27.8% CPU Minutes

### Priority Workload Metrics

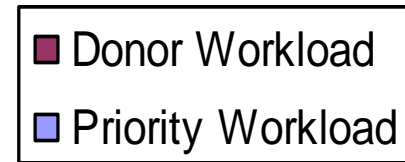
Total Throughput: 9.125M  
Avg Response Time: 140ms



# Priority Workload On System z Doesn't Degrade When Low Priority Donor Workload Is Added



Run High Priority  
And Low Priority  
Workloads Together

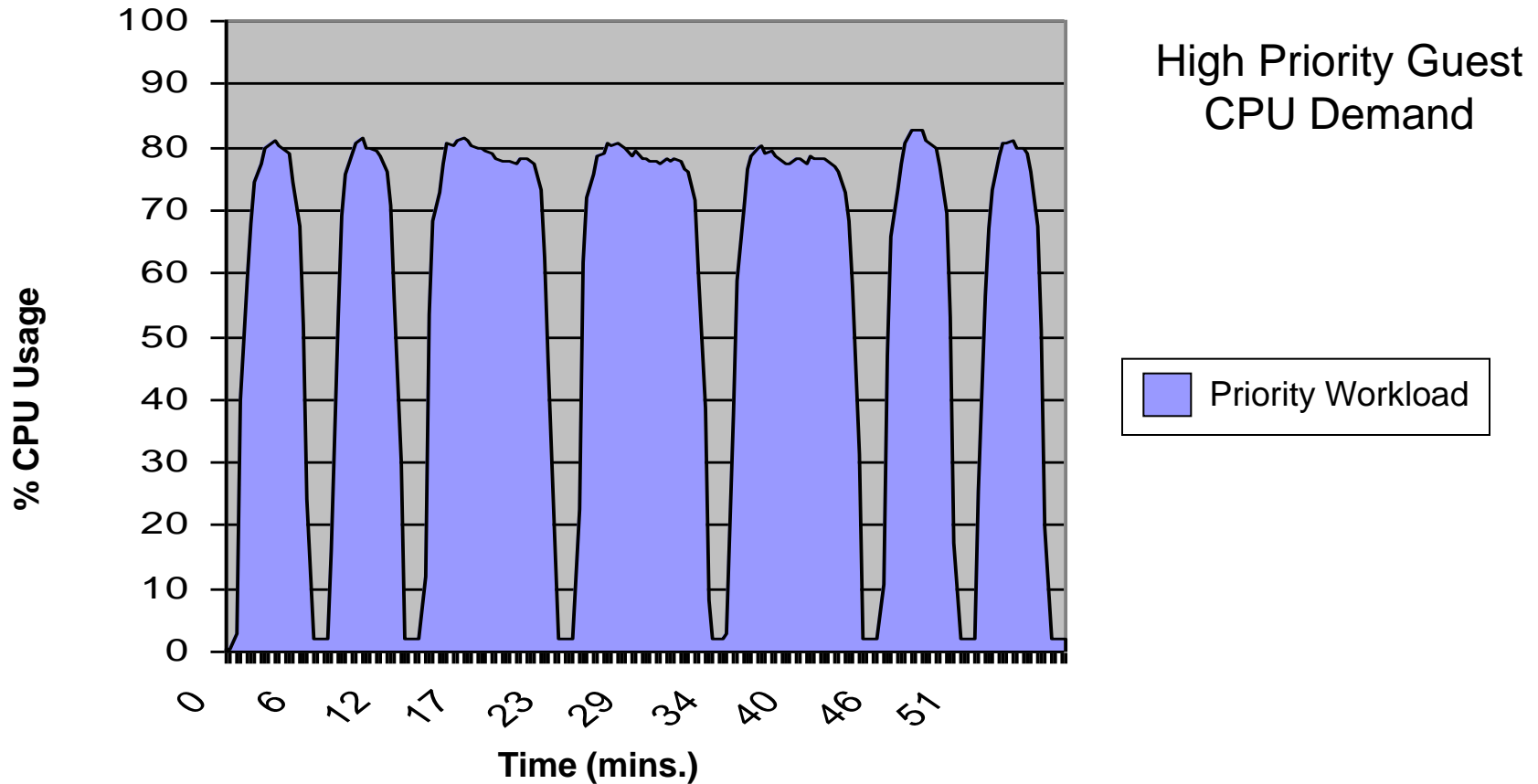


**NO**  
*throughput leakage*  
**NO**  
*response time increase*

**Capacity Used**  
High Priority - 74.2% CPU Minutes  
Low Priority - 23.9% CPU Minutes  
Wasted - 1.9% CPU Minutes

**Priority Workload Metrics**  
Total Throughput: 9.125M  
Avg Response Time: 140ms

# Priority Workload With Varying Demand Running Standalone On x86 Hypervisor



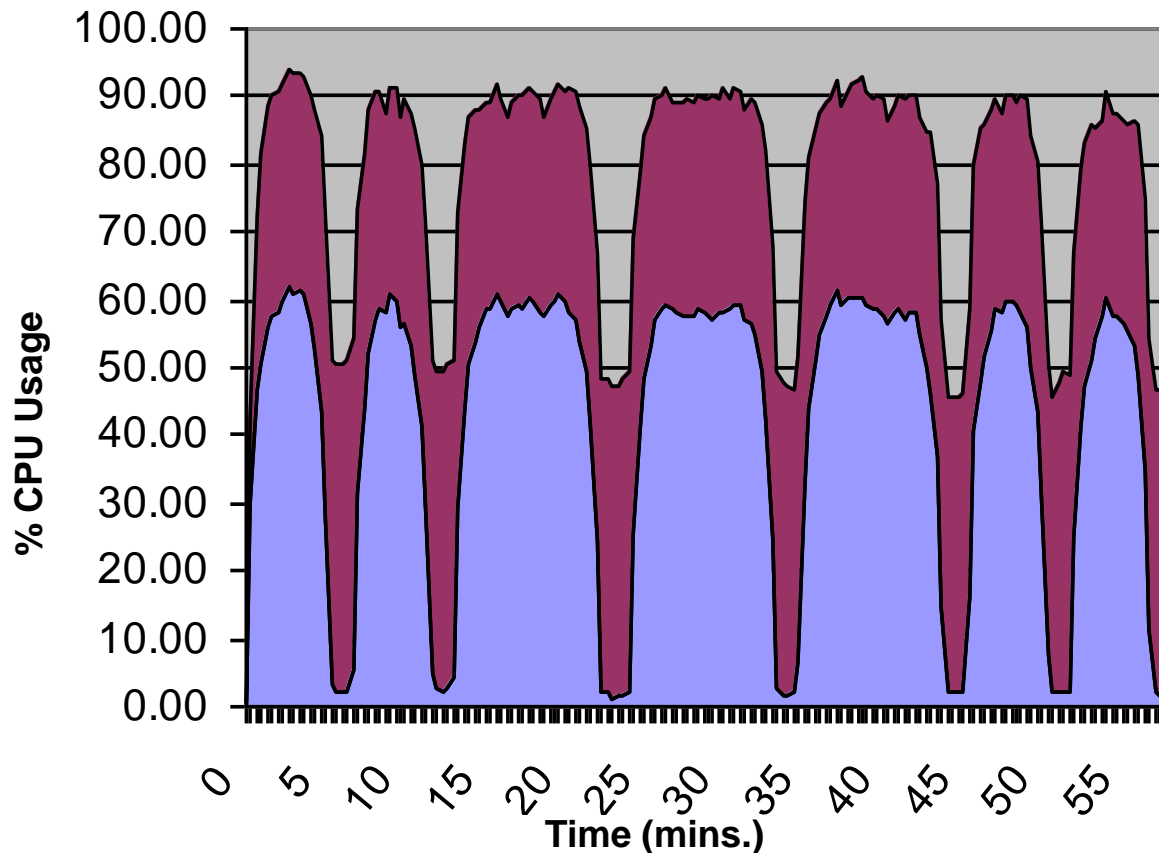
## Capacity Used

High Priority - 57.5% CPU Minutes  
Unused (wasted) - 42.5% CPU Minutes

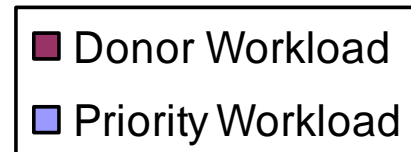
## Priority Workload Metrics

Total Throughput: 6.47M  
Avg Response Time: 153ms

# Priority Workload On x86 Hypervisor Degrades Severely When Low Priority Workload Is Added



Run High Priority  
And Low Priority  
Workloads Together

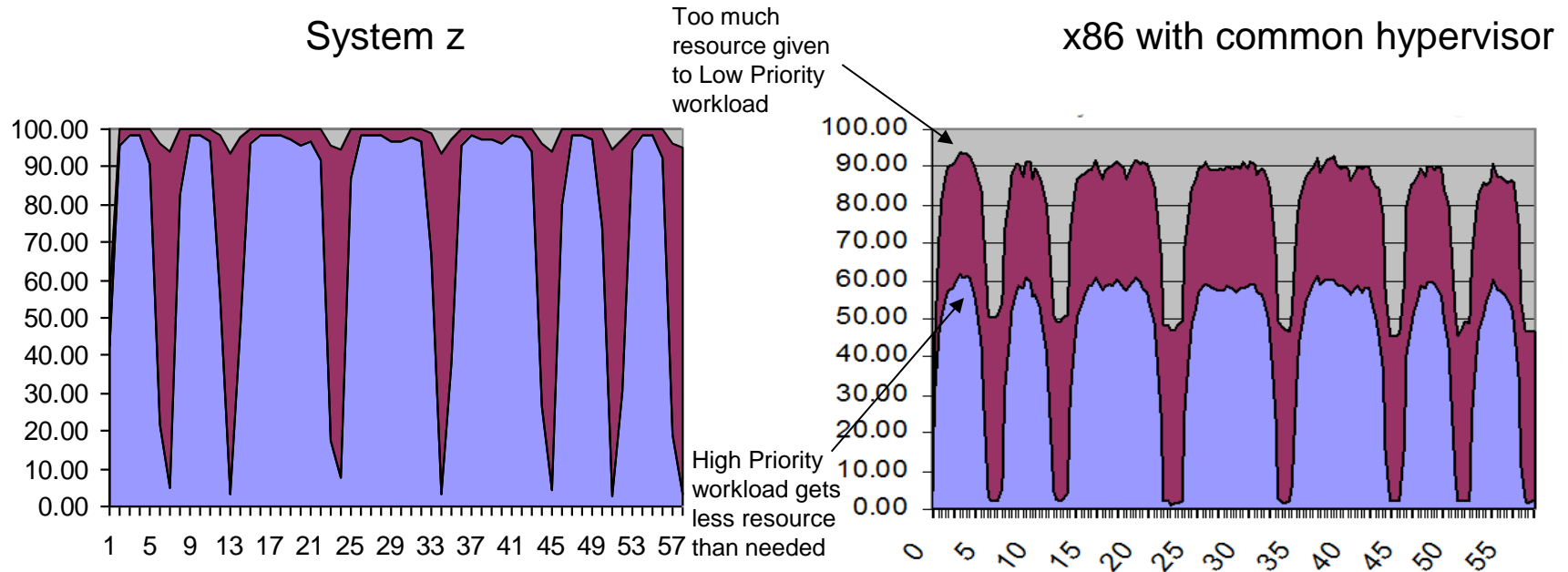


**30.7%**  
*throughput leakage*  
**45.1%**  
*response time increase*  
**21.9%**  
*wasted CPU minutes*

**Capacity Used**  
High Priority - 42.3% CPU Minutes  
Low Priority - 35.8% CPU Minutes  
Wasted - 21.9% CPU Minutes

**Priority Workload Metrics**  
Total Throughput: 4.48M  
Avg Response Time: 220ms

# System z Virtualization Enables Mixing Of High And Low Priority Workloads Without Penalty

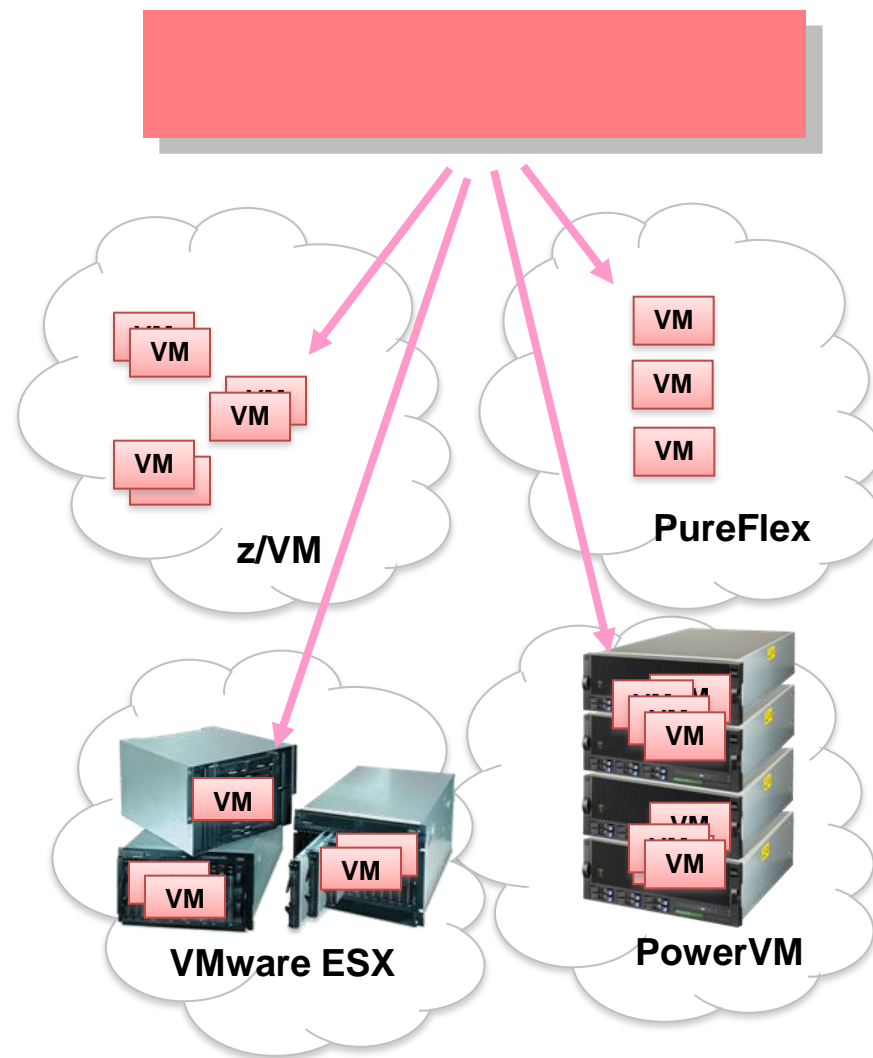


- Perfect workload management
- Consolidate workloads of different priorities on the same platform
- Full use of available processing resource (high utilization)

- Imperfect workload management
- Forces workloads to be segregated on different servers
- More servers are required (low utilization)

# Automate Workload Deployment With IBM SmartCloud Provisioning

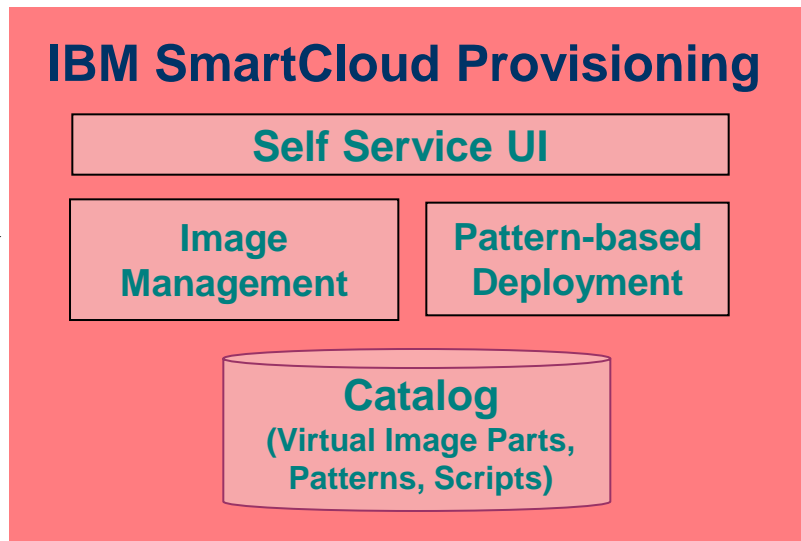
- Self-service automated provisioning of virtual machine images...
- ...into pools/clouds of external virtualized hardware
  - ▶ Can deploy to various virtualized platforms
  - ▶ Supports zVM, PowerVM, VMware ESX hypervisors
- Supports IBM patterns
  - ▶ Deploy multiple virtual machines in a single operation
  - ▶ Images can include middleware and applications



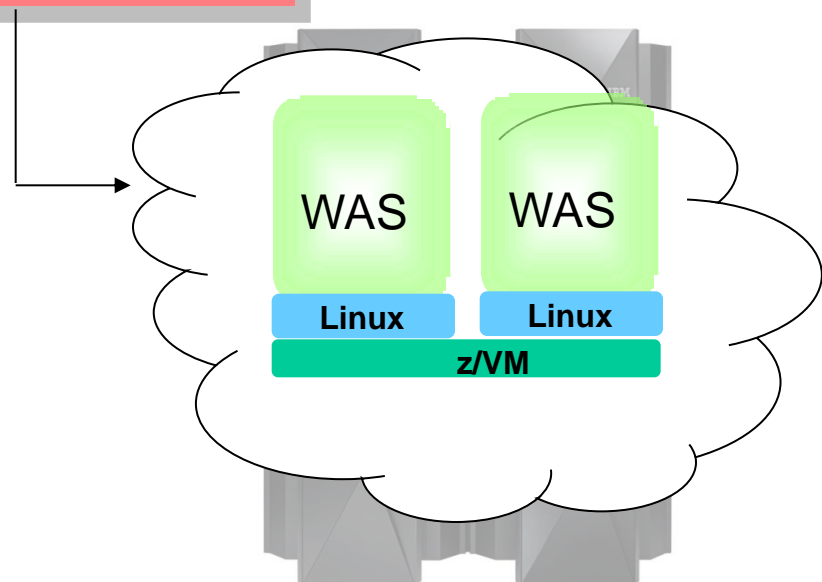
# Automation With IBM SmartCloud Provisioning Can Further Reduce Costs



User selects and deploys a pattern

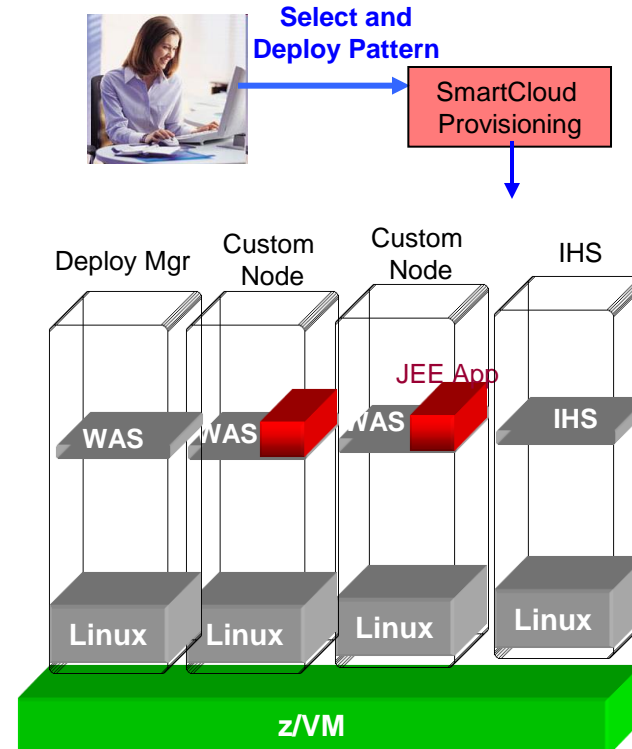


- Self-service console for users
- Virtual images and patterns for quick-starts
- Drag and drop tooling for creating and deploying virtual applications using catalog
- Intelligent placement algorithm optimize resource utilization based on cloud activity



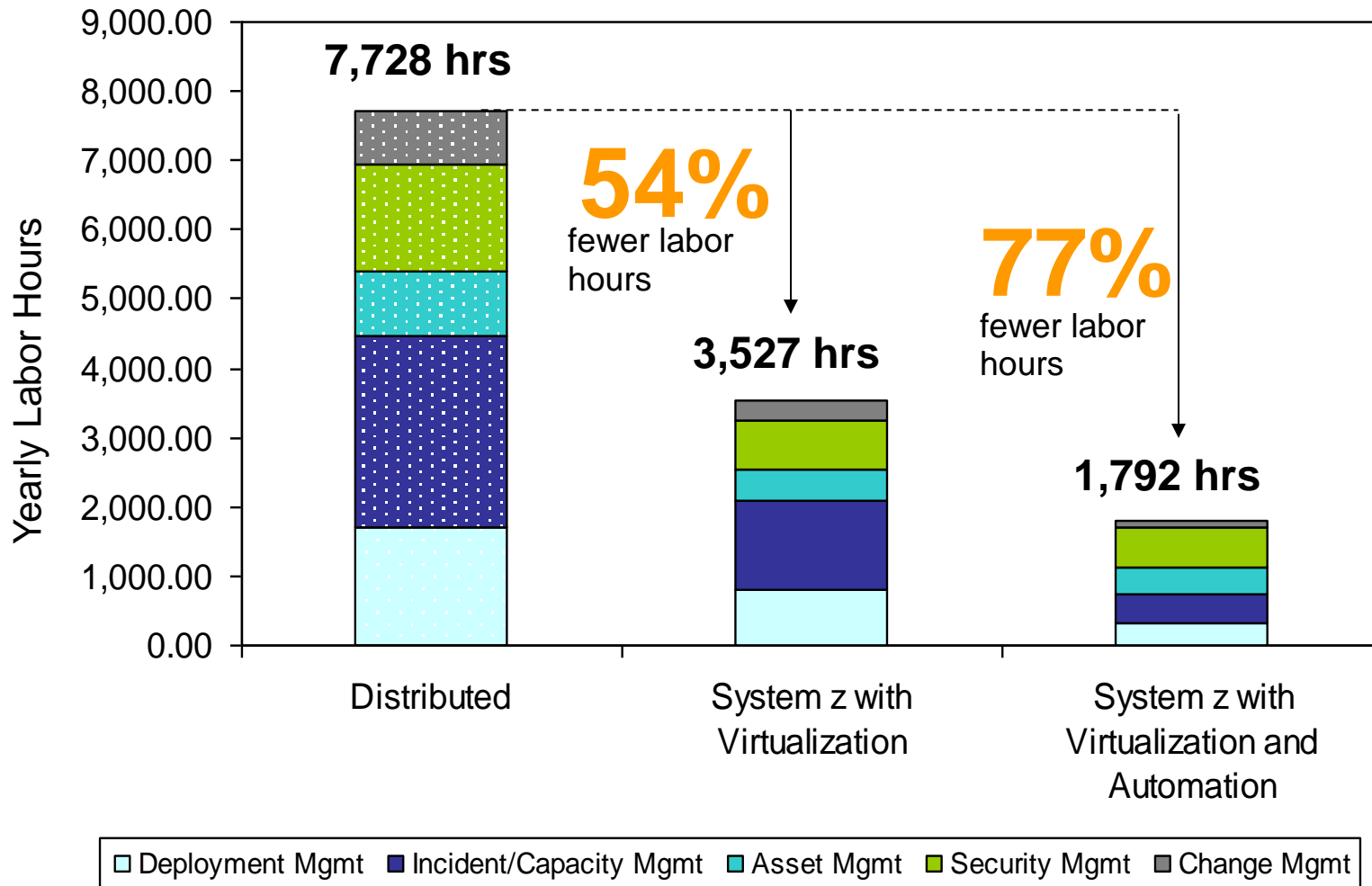
# Example: Fast Deployment Of WAS Cluster With IBM SmartCloud Provisioning

- Self-service console for user
- Drag and drop pattern editor to create a WAS cluster pattern
- Automated provisioning of the cluster



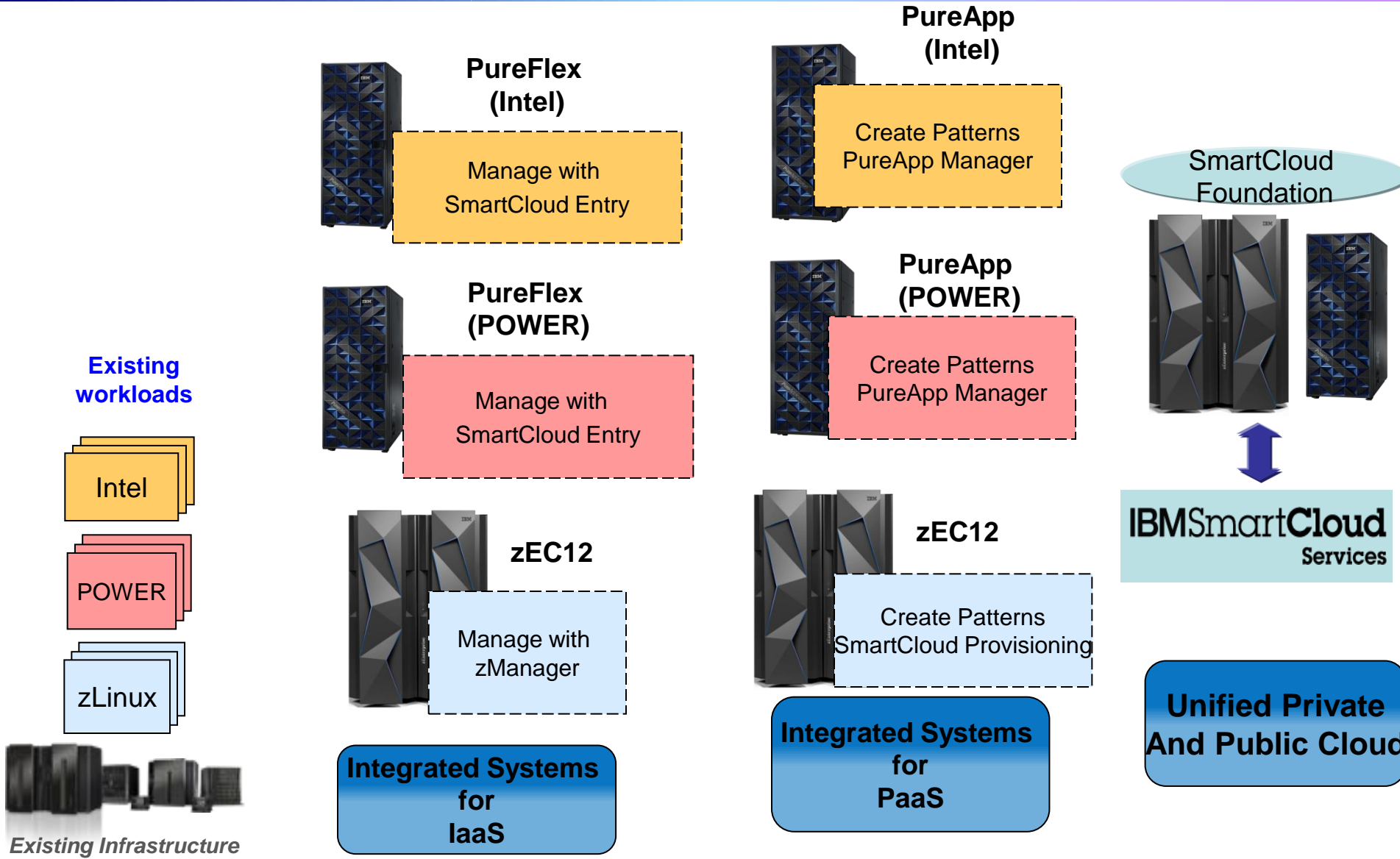
# IBM SmartCloud Provisioning Cuts Labor Costs

## Case Study With 48 Workloads





# Unified Data Center Cloud – Benefits



# Strategic Direction – Unified Management For The Entire Data Center Cloud



- Creation of **common, standards based architecture**
- Entry points and offering packages serving different markets, buyers, and price points
- Supports existing and new infrastructure investments
- Delivers application and middleware pattern portability

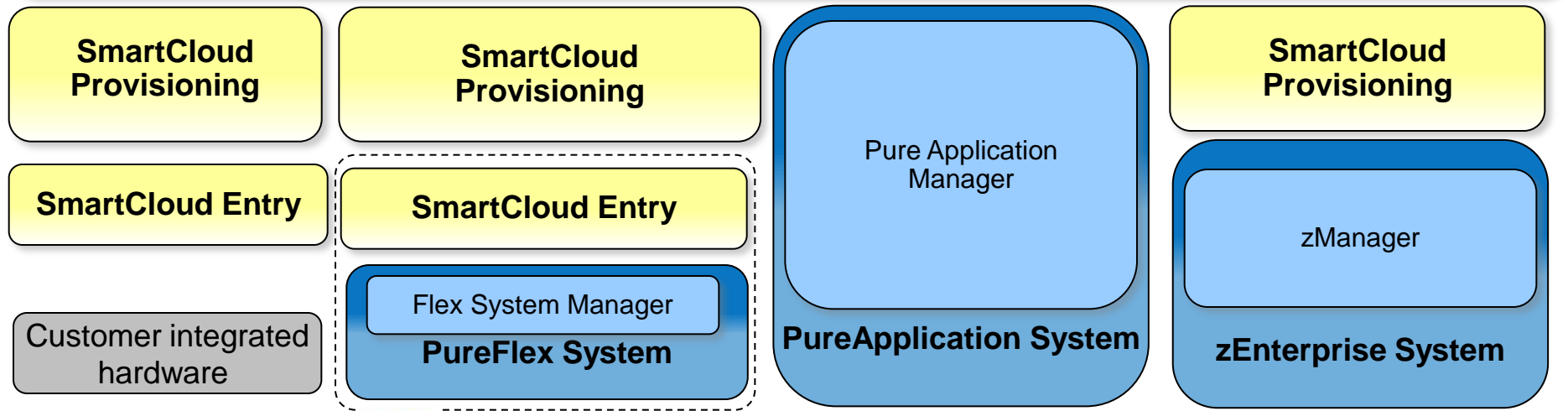
**Bundle Option**

**SmartCloud Foundation  
(Common Cloud Stack)**

**Factory Integrated &  
Optimized by IBM**

## SmartCloud Orchestrator

Orchestrate Services across multiple environments and domains



CIMI & OVF



TOSCA



International Organization for Standardization



CCRA

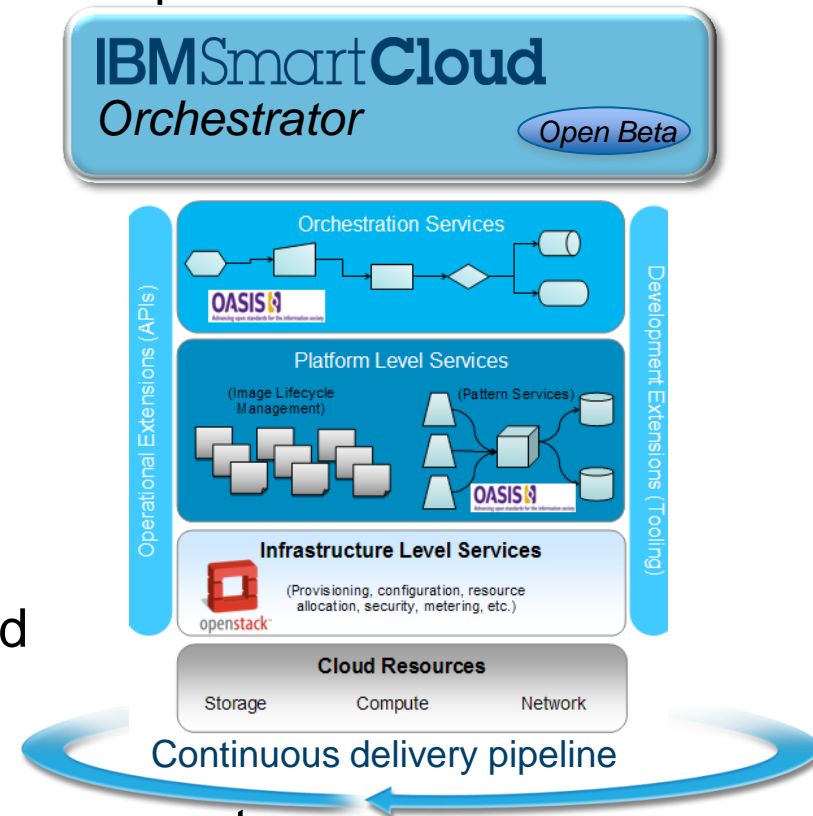


OSLC



# IBM SmartCloud Orchestrator

- New cloud offering based on open standard OpenStack
- Fully automates end-to-end service deployment across infrastructure and platform layers
- Accelerated deployments with reusable workload patterns and orchestration workflows
- Supports deployment to both private and public clouds
- Comprehensive monitoring and cost management
- Available for VMware and KVM today – Power & System z soon



# Blueprint For Cloud Success

- A practical cloud strategy should try to preserve and re-use existing image investments
- Survey workloads and identify candidates for a private cloud
- Assess best fit platform for each workload
  - ▶ Architectural match
  - ▶ Workload optimized systems
  - ▶ Individual workload size
  - ▶ Quality of Service requirements
- Define step-by-step projects
  - ▶ Immediate benefits for each step to maintain project enthusiasm
    - Price/performance
    - Labor
    - Agility
- No-charge IBM Eagle TCO service can help assess fit for purpose and cost per workload



Thank  
You

David.Rhoderick@us.ibm.com

Session 13660