



**The New zEnterprise –  
A Smarter System For A Smarter Planet**  
A Strategic Enterprise Cloud Platform

# Pulse**ANZ**2010

Meet the people who can help  
advance your infrastructure





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# Using a Cloud to Reduce I/T Costs

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I'm thinking about moving some of my workloads over to the public cloud to reduce costs...



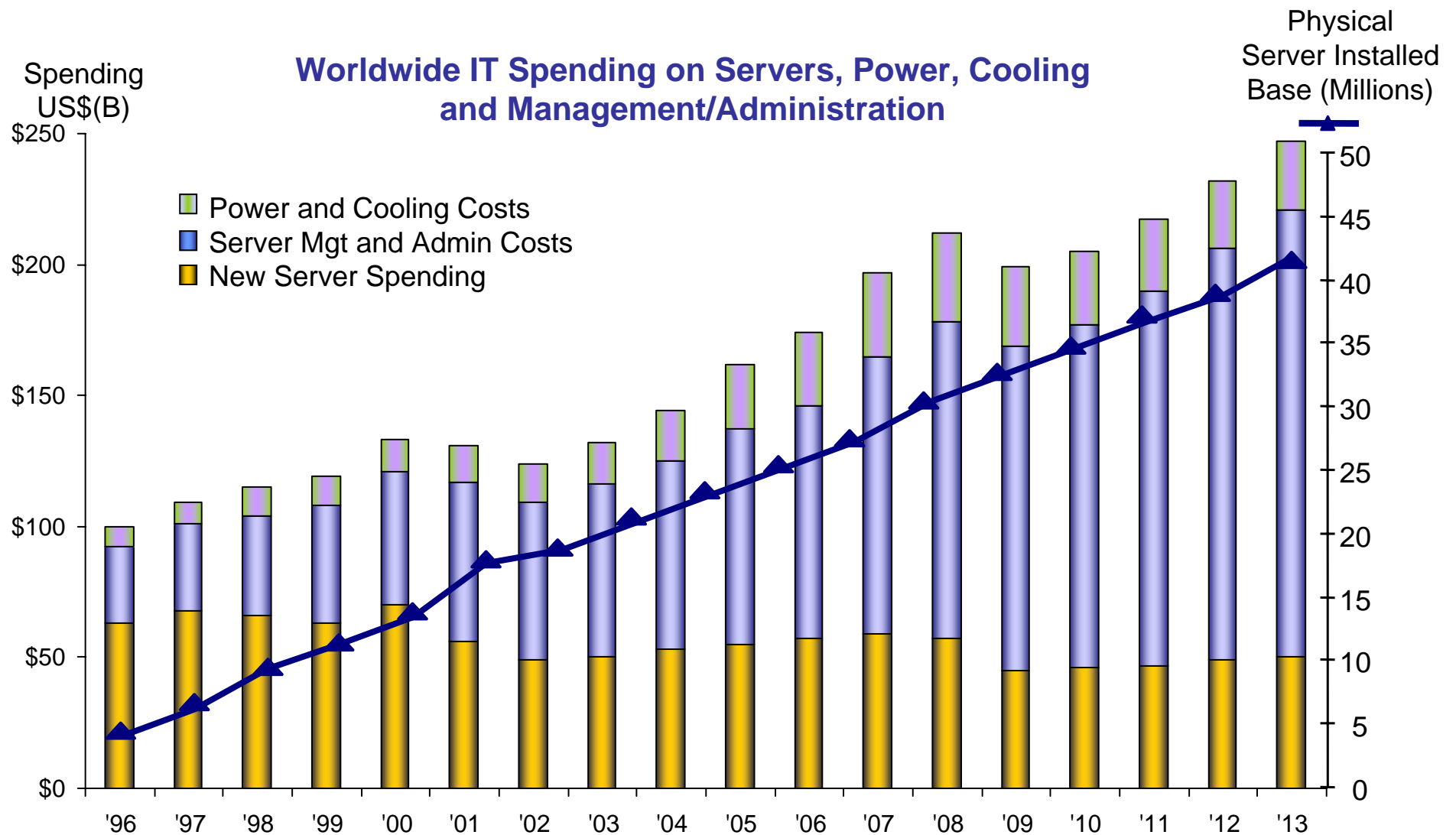
**CUSTOMER**

You can actually lower your cost more with a private cloud on zEnterprise!



**IBM**

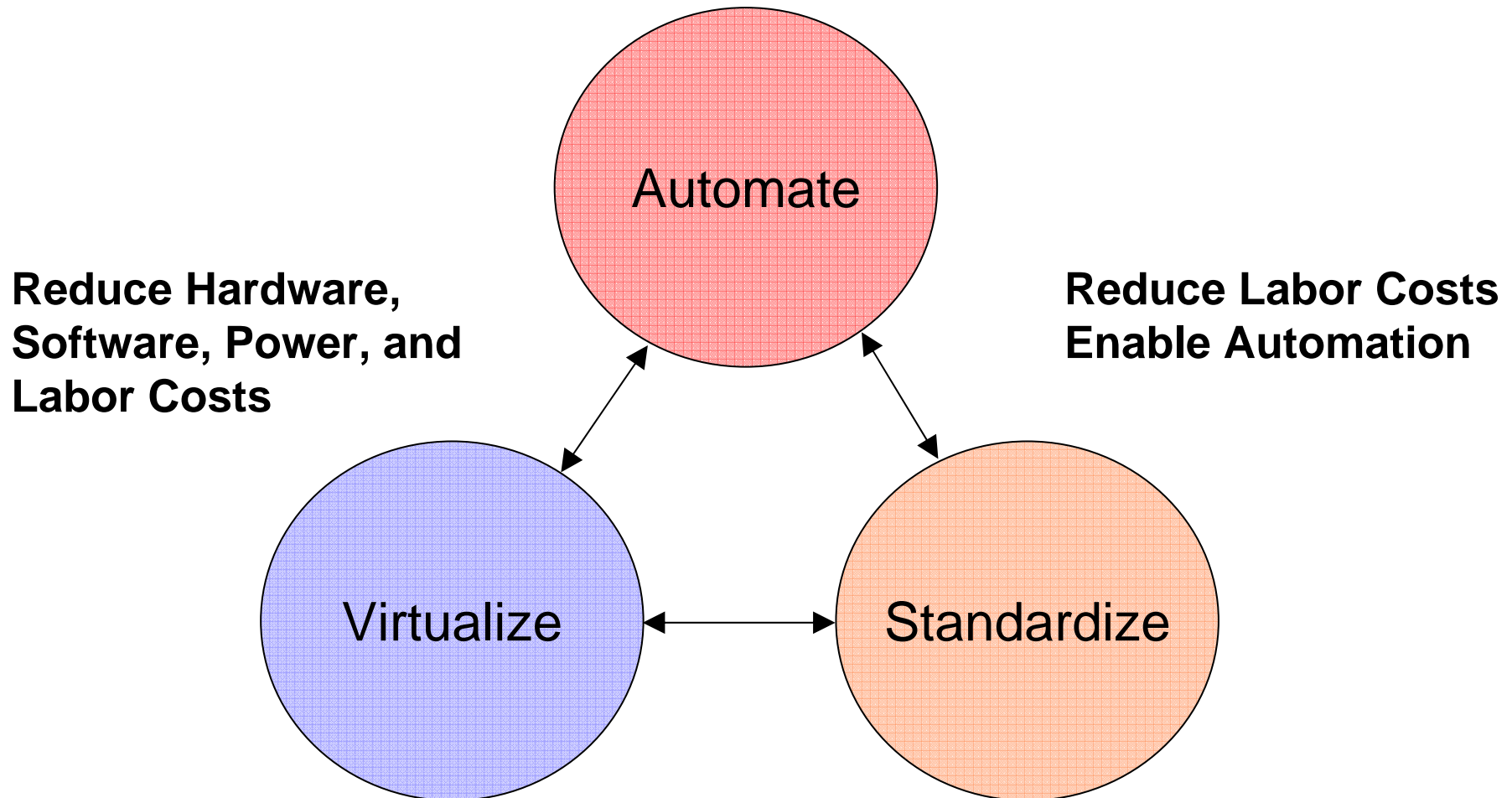
# Annual Operating Costs Are Out Of Control



# A Virtuous Circle To Reduce I/T Costs

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**Reduce Labor Costs  
Improve Service**



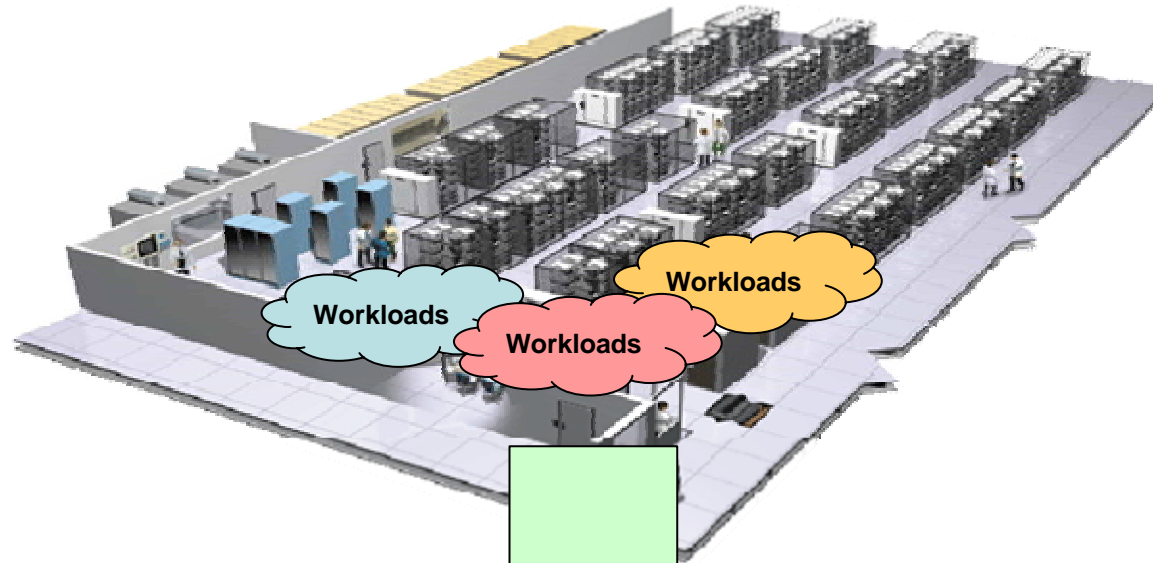
# Public Cloud Providers Are Leveraging This Virtuous Circle

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- Line-of-business units can now go to public cloud providers for IT infrastructure services
  - ▶ Amazon Web Services (AWS)
  - ▶ Microsoft Azure
- Low cost, pay-per-use model seen as more cost-effective
  - ▶ Amazon EC2: \$0.10/hour (small Linux/UNIX instance)
- Near-immediate provisioning enables users to respond at market speed
  - ▶ 64-node Linux cluster available in 5 minutes on AWS vs. 3 months internally<sup>1</sup>
- **Private Clouds can leverage the same advantages!**

<sup>1</sup> [http://www.informationweek.com/cloud-computing/blog/archives/2009/01/whats\\_next\\_in\\_t.html](http://www.informationweek.com/cloud-computing/blog/archives/2009/01/whats_next_in_t.html)  
Service Management Drives Savings

# zEnterprise Value Proposition Also Extends to the Private Cloud

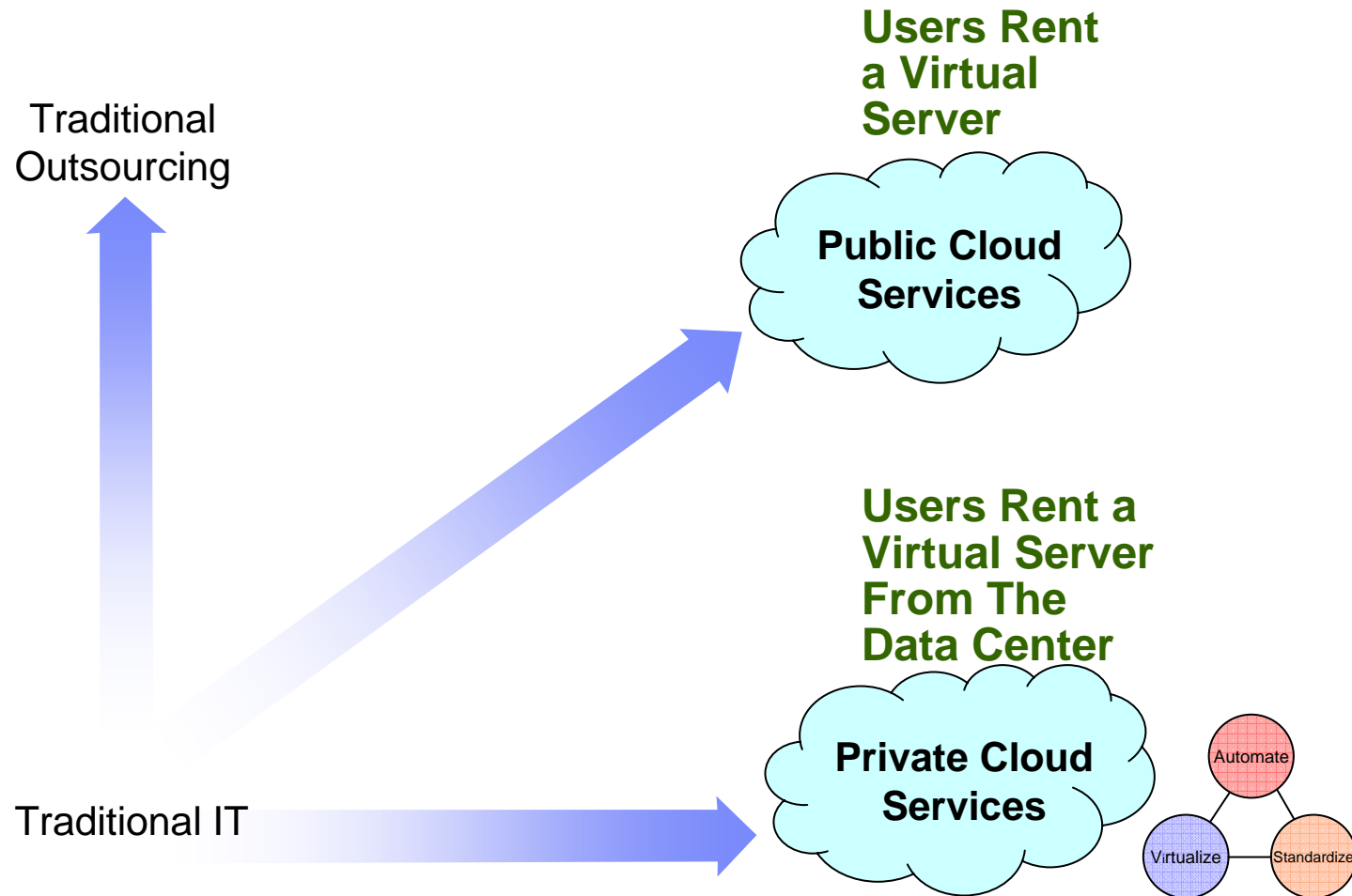


**Fit for Purpose**  
minimizes **cost of acquisition** and  
preserves quality of  
service

**Centralized platform**  
and structured practices  
minimize **labor costs**



# Which Option Achieves the Lowest TCO?

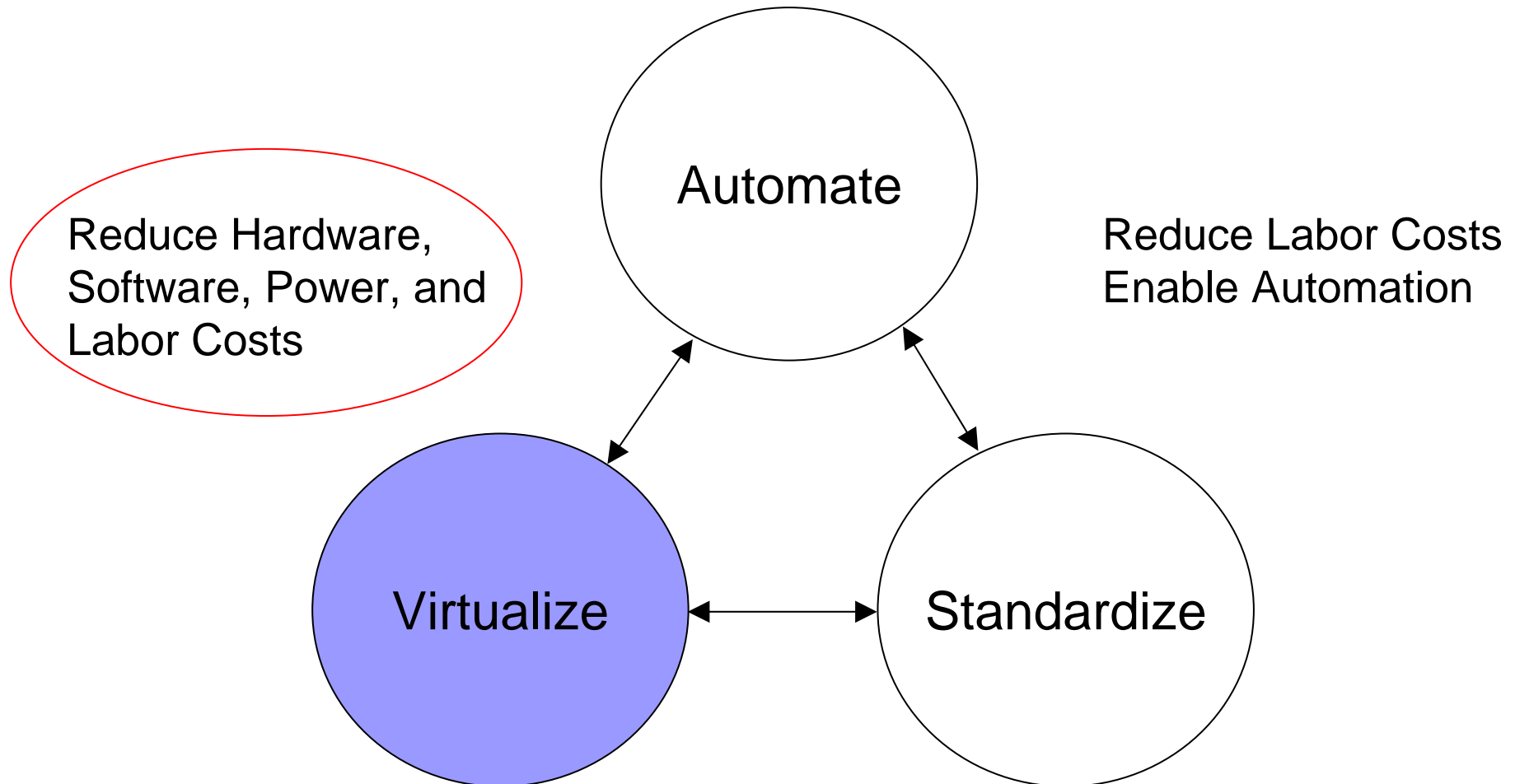




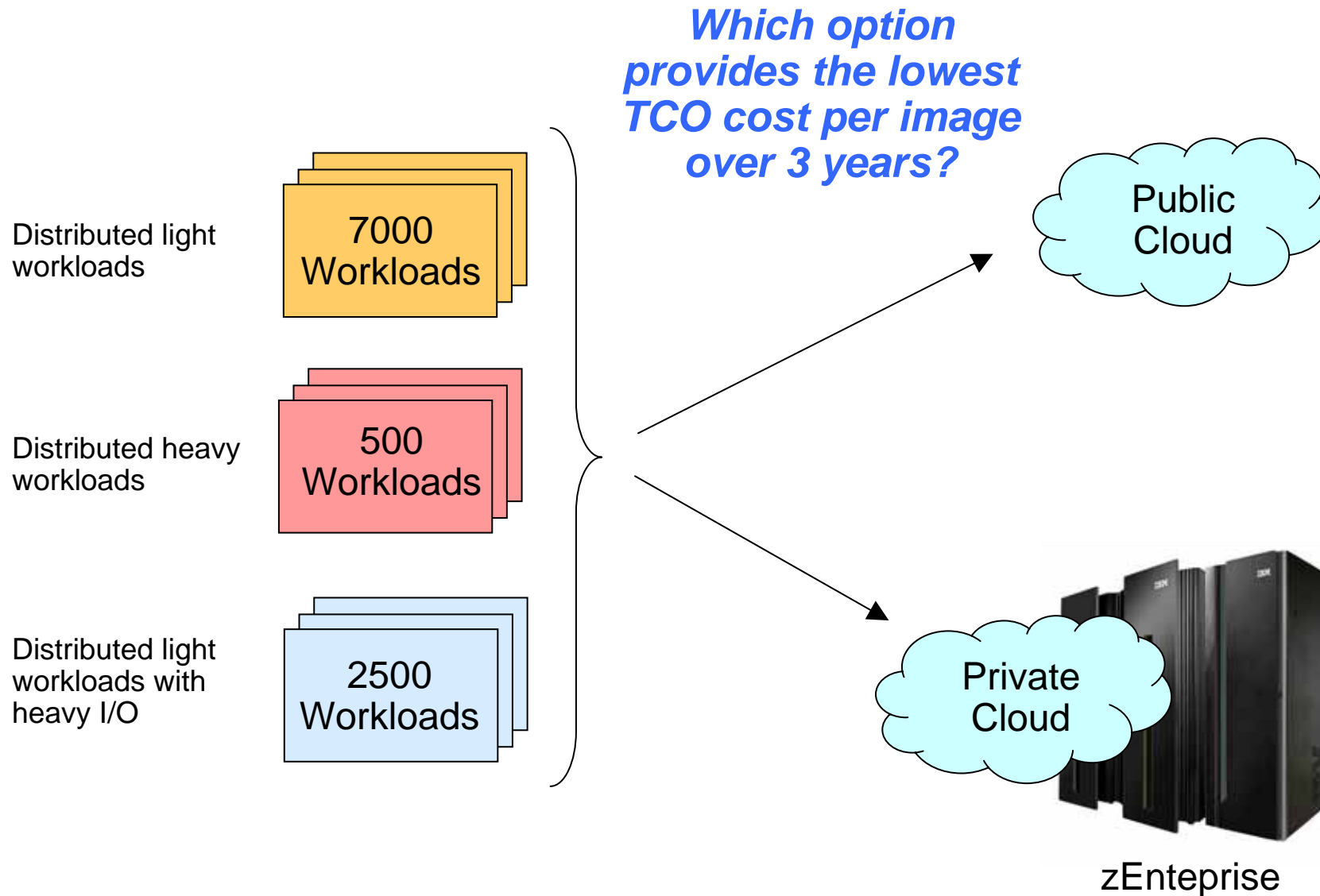
# A Virtuous Circle To Reduce I/T Costs

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Reduce Labor Costs  
Improve Service



# Public vs. Private Cloud: Which Option Costs Less for Running Mixed Workloads?



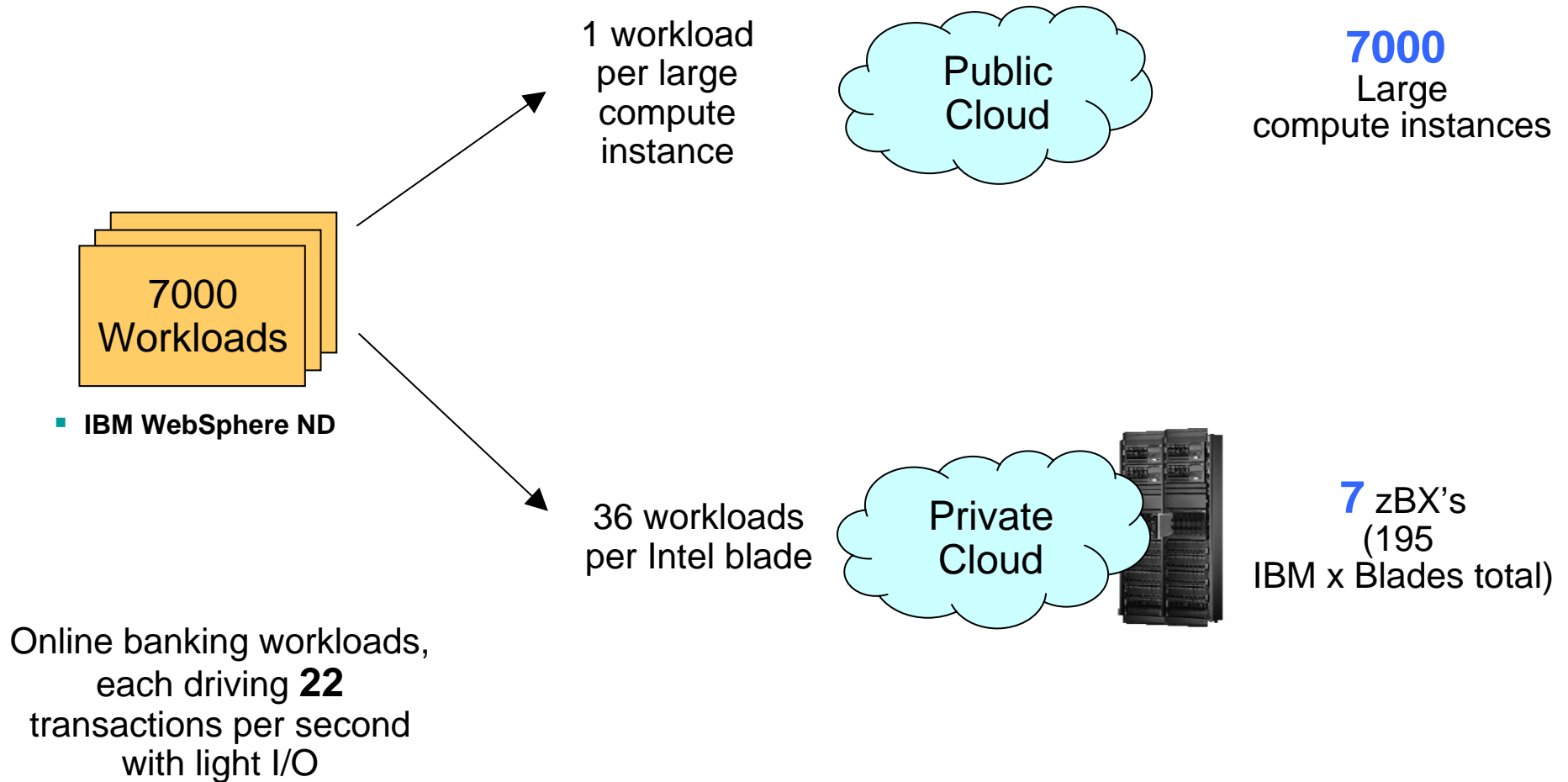
# Mixed Workloads Require Robust Public Cloud Compute Instance and I/O Requirements

	Light Workload	Heavy Workload	Light Workload with Heavy I/O
System under test	IBM x366 (4-core Xeon)	IBM x3650 M2 (8-core Nehalem EP)	IBM x366 (4-core Xeon)
Average utilization	5%	16%	5%
Peak utilization	30%	96%	30%
Peak-based RPE2	630 (2100 x 0.30)	13,795 (14,370 x 0.96)	630 (2100 x 0.30)
<b>Equivalent Amazon EC2 instance size#</b>	<b>Large</b> (430 x 2 = 860)	<b>Cluster Compute Quadruple Extra Large</b> (430 x 33.5 = 14,405)	<b>Extra Large</b> (430 x 2 = 860)
<b>Cost per instance</b>	\$1400 + \$0.12 per hour*	\$6590 + \$0.56 per hour*	\$2800 + \$0.24 per hour*

\* Based on use of Linux reserved instances and 3-year term

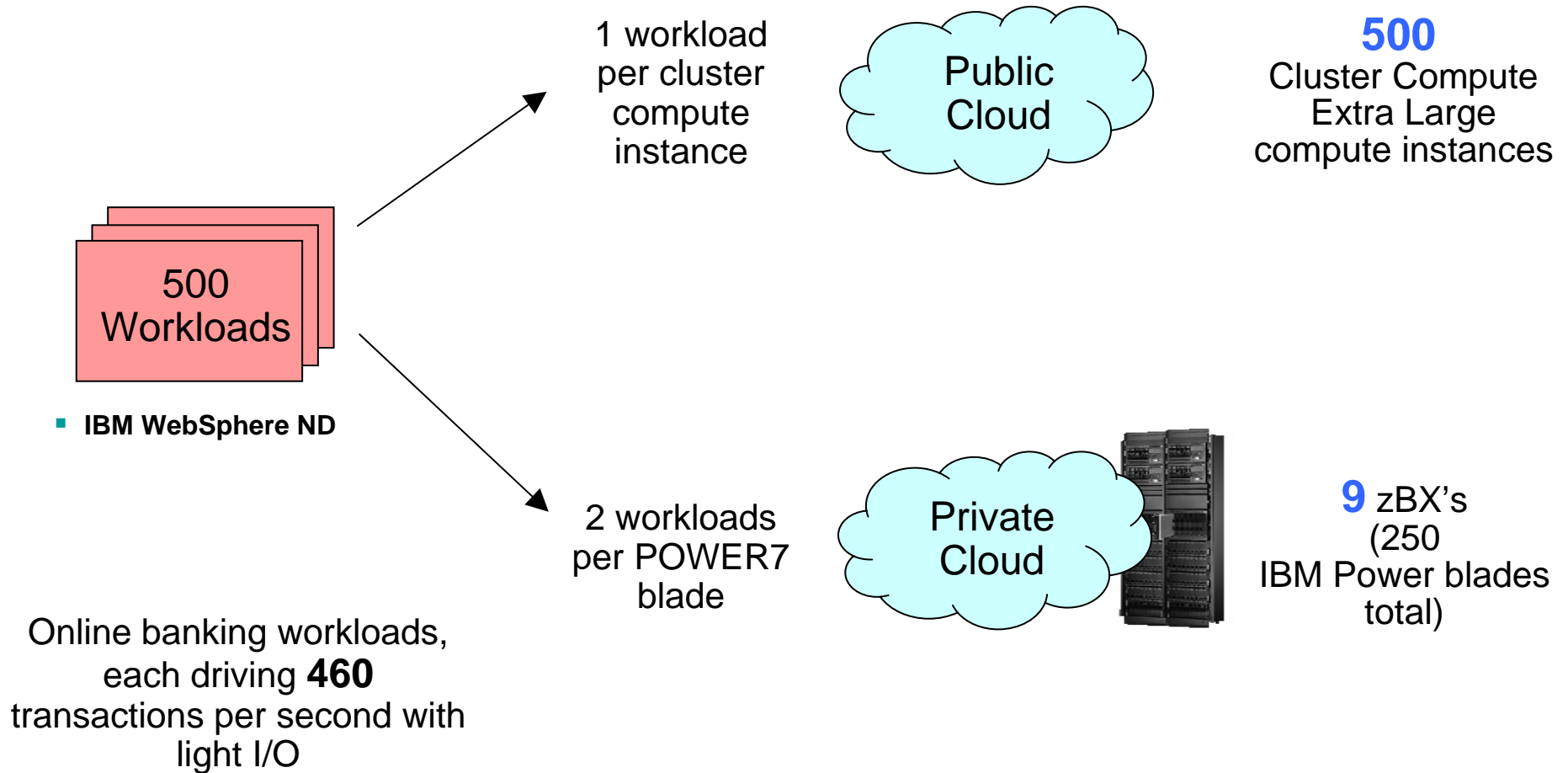
#: Amazon.com (small EC2 instance estimated to be = 430 RPE2)

# Deploying Light Workloads



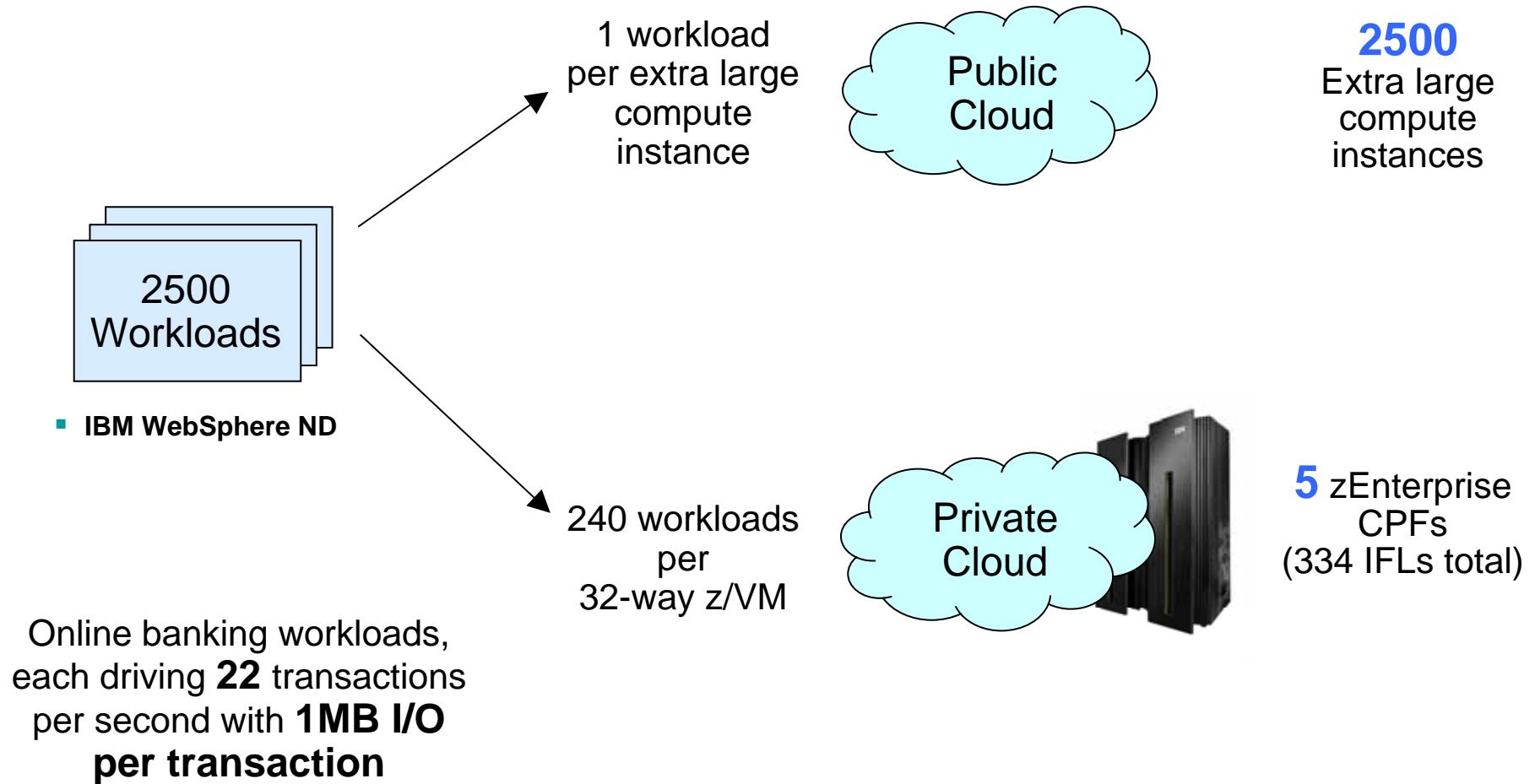
\* CPO on-line banking benchmark

# Deploying Heavy Workloads with Light I/O



\* CPO on-line banking benchmark

# Deploying Light Workloads with Heavy I/O



▪ IBM WebSphere ND

Online banking workloads, each driving **22** transactions per second with **1MB I/O per transaction**

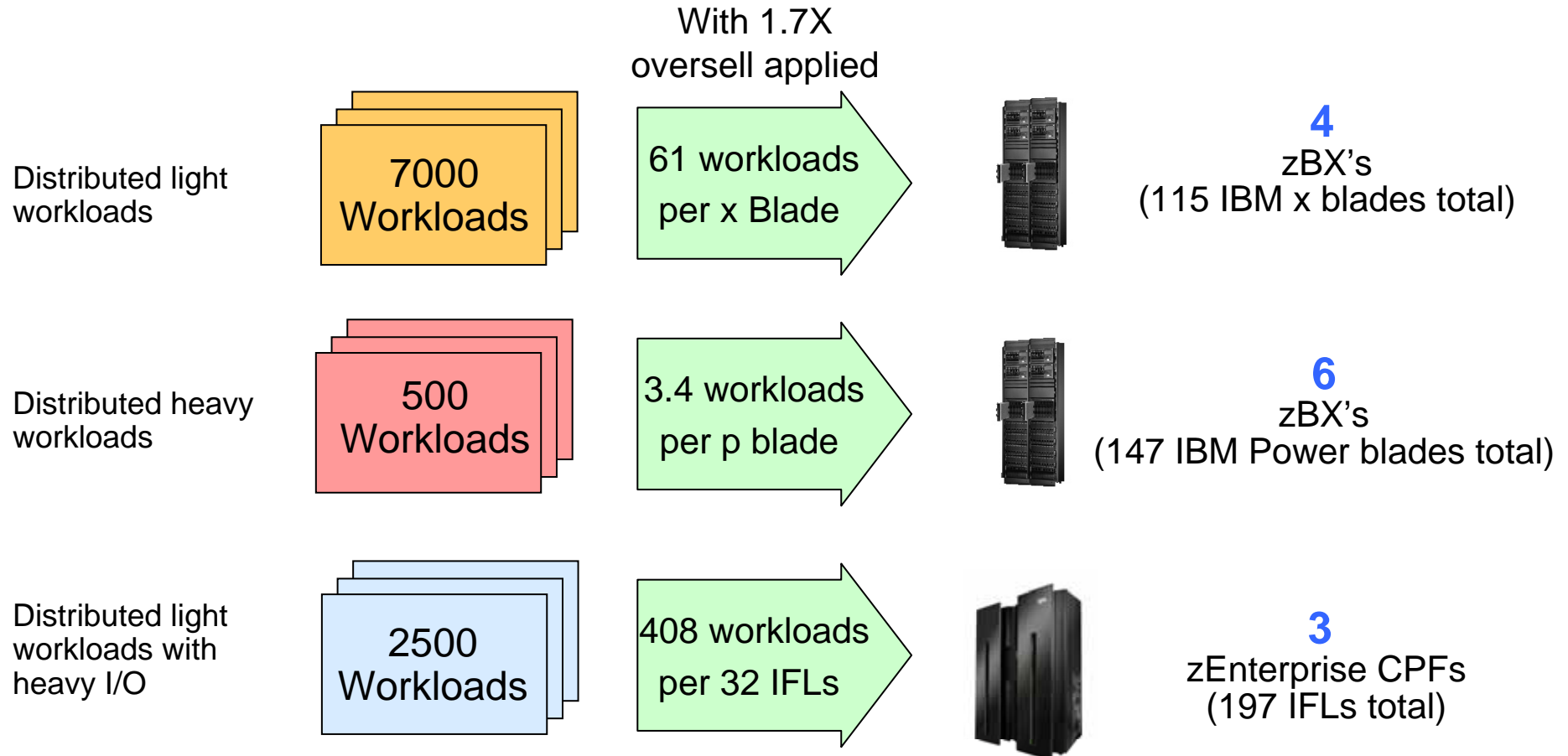
\* CPO on-line banking benchmark

# Variability in Image Usage Allows for Reduction in the Number of Servers Required

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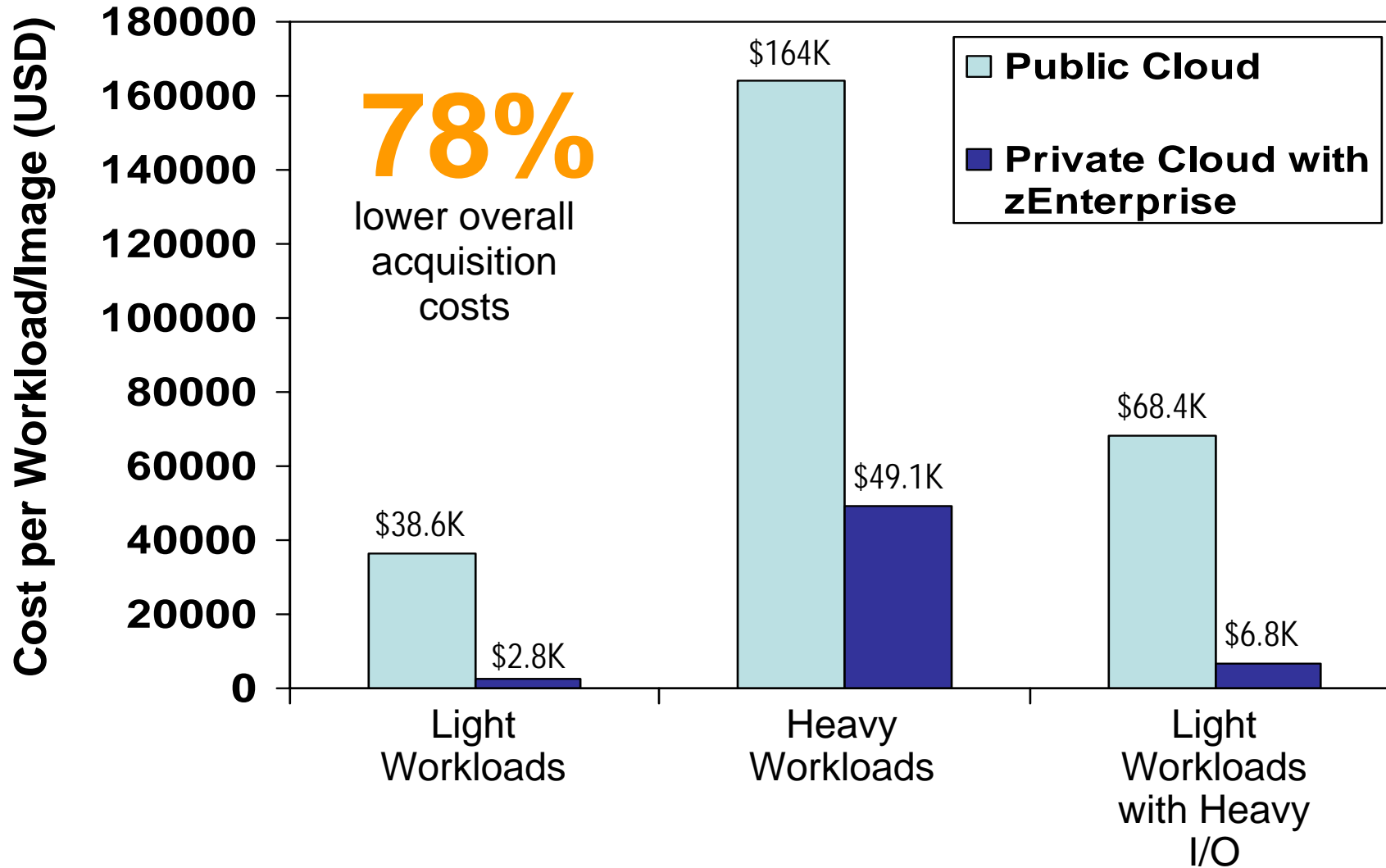
- Consolidation ratios based on benchmark data assume “always on” operation
- On average, not all workloads are active all the time
- Amazon EC2 public cloud recognizes this by running with an “oversold” factor of 1.7
  - ▶ Assumes each server can support 1.7 times the indicated capacity of virtual machines
- This means we don’t need as many servers as the benchmarks indicate

# zEnterprise Resources Required with 1.7X “Oversell” Factor Applied





# Hardware And Software Costs Per Image for 10,000 Linux Workloads (3 Yr TCA)



# zEnterprise Offers Lower Hardware Cost per Workload Compared to Public Cloud

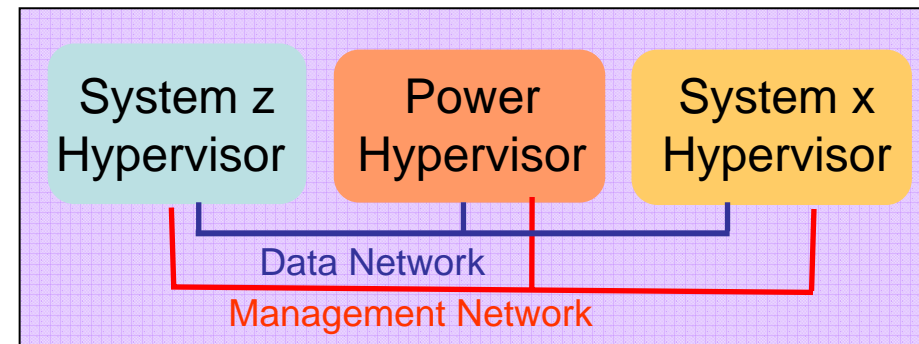
<b>BACK-UP ONLY</b>	Light Workload		Heavy Workload		Light Workload with Heavy I/O	
	x Blade	Amazon Large EC2	p Blade	Amazon Cluster Compute Extra Large EC2	z IFL	Amazon Extra Large EC2
<b>Hardware/instance cost</b>	\$18,598 per blade	\$1400 + \$0.14/hr	\$26,707 per blade	\$6590 + \$0.56/hr per node	\$1,310,688 per 32-way	\$2800 + \$0.24/hr
<b>Workloads per hardware/instance</b>	61	1	3.4	1	408 per 32-way	1
<b>Hardware cost per workload</b>	\$306	\$7,629*	\$7,852	\$19,621*	\$3,212	\$14,400*
<b>Power/Facilities cost per workload</b>	TBD	INCL	TBD	INCL	TBD	INCL
<b>Total cost per workload</b>	\$306	\$7,629	\$7,852	\$19,621	\$3,212	\$14,400
<b>zEnterprise Advantage</b>	25X		2.5X		4.5X	

\* Includes EC2 instance cost plus storage costs (EBS, S3, data transfer costs) necessary to run application

# zEnterprise Minimizes Labor Associated With Virtualization Hypervisor And Network Set-Up

- Hypervisors are shipped, serviced, and deployed as System z Licensed Internal Code
  - ▶ Booted automatically at power on reset
- Pre-configured private and physically isolated internal management network
  - ▶ 1 Gbps that connects all resources for management purposes
- Private and secure data network
  - ▶ 10 Gbps that connects all resources
  - ▶ Access-controlled using integrated virtual LAN (VLAN) provisioning that requires no external switches or routers
  - ▶ Full redundancy for high availability

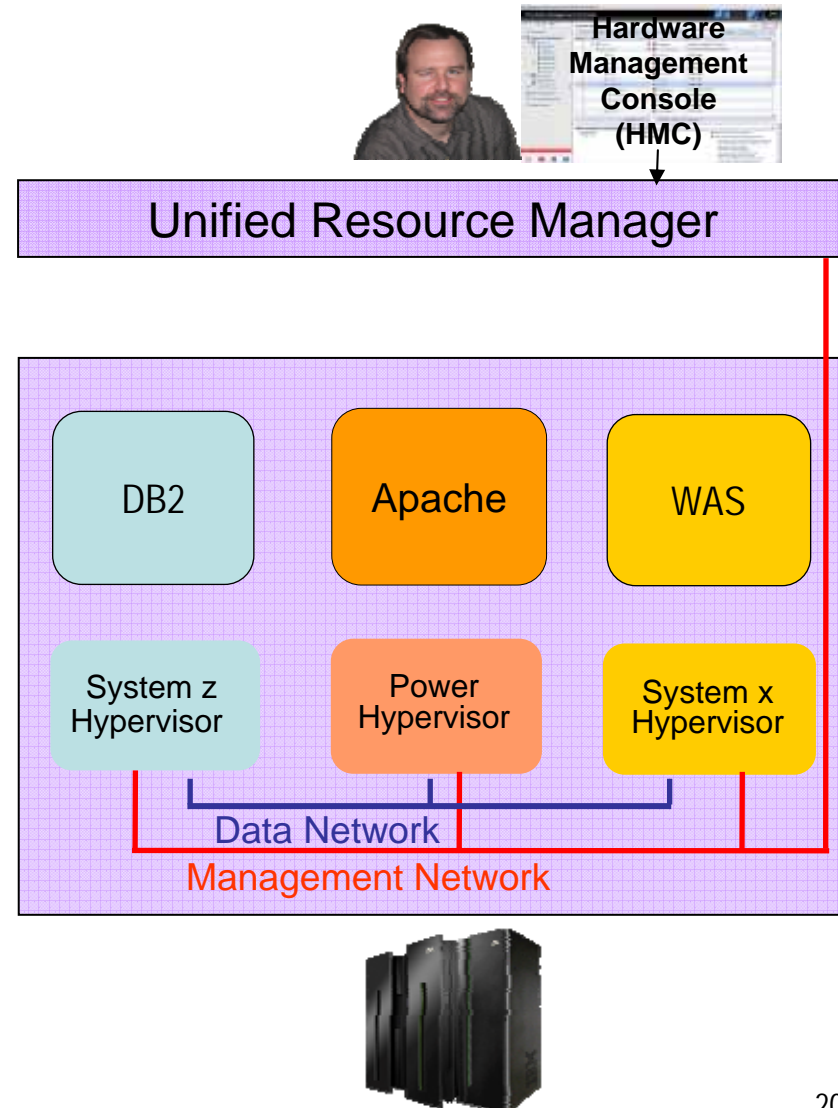
## Centralized and Secure Virtualization Platform



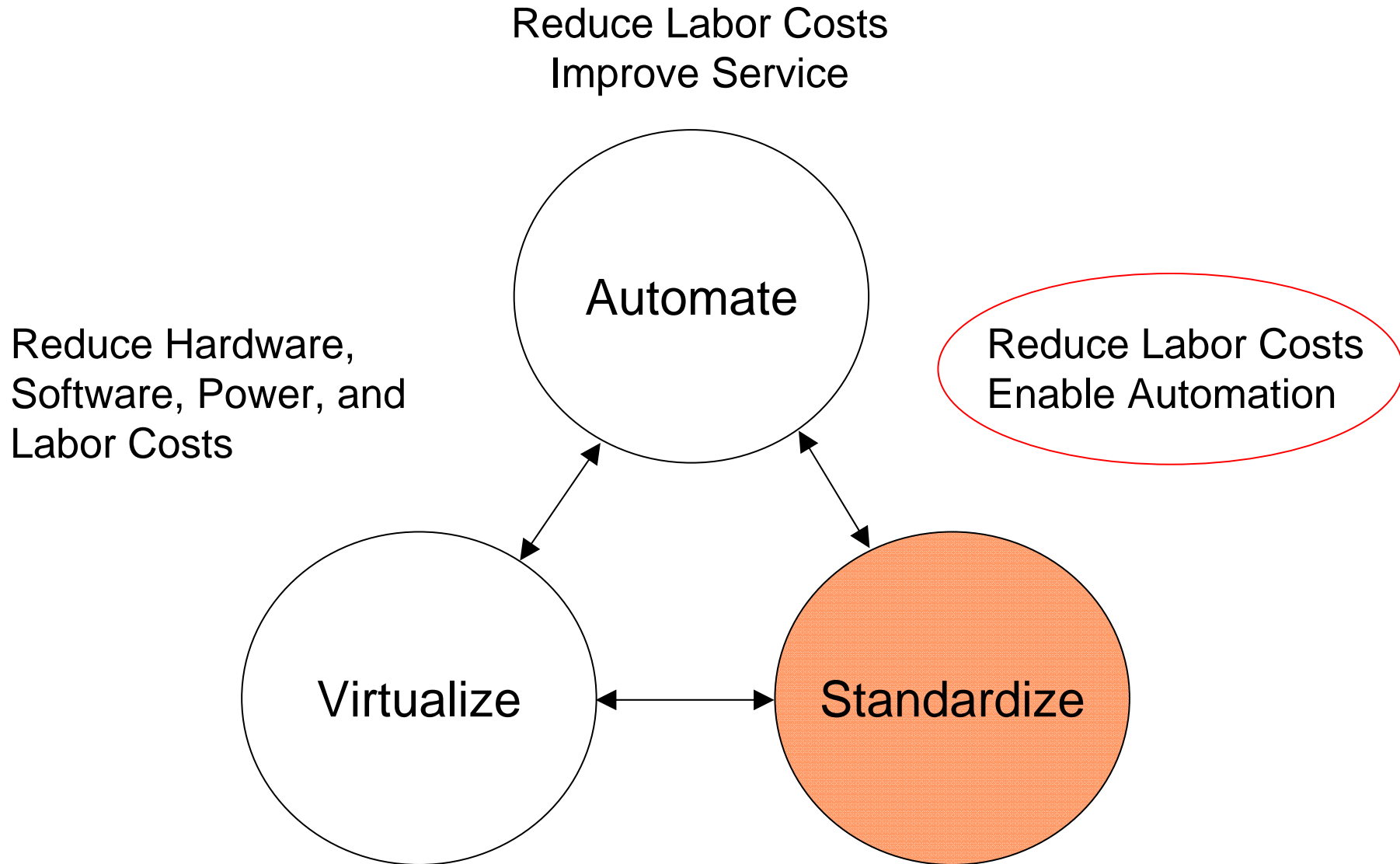
**zEnterprise**

# Unified Resource Manager Reduces Virtualization Management Labor For Fit-for-Purpose Workloads

- Automatic inventory of all elements
- Update configuration and service
- Create virtual machines across all hypervisors from one console
- Manage performance of virtual machines as a group for a business workload



# A Virtuous Circle To Reduce I/T Costs

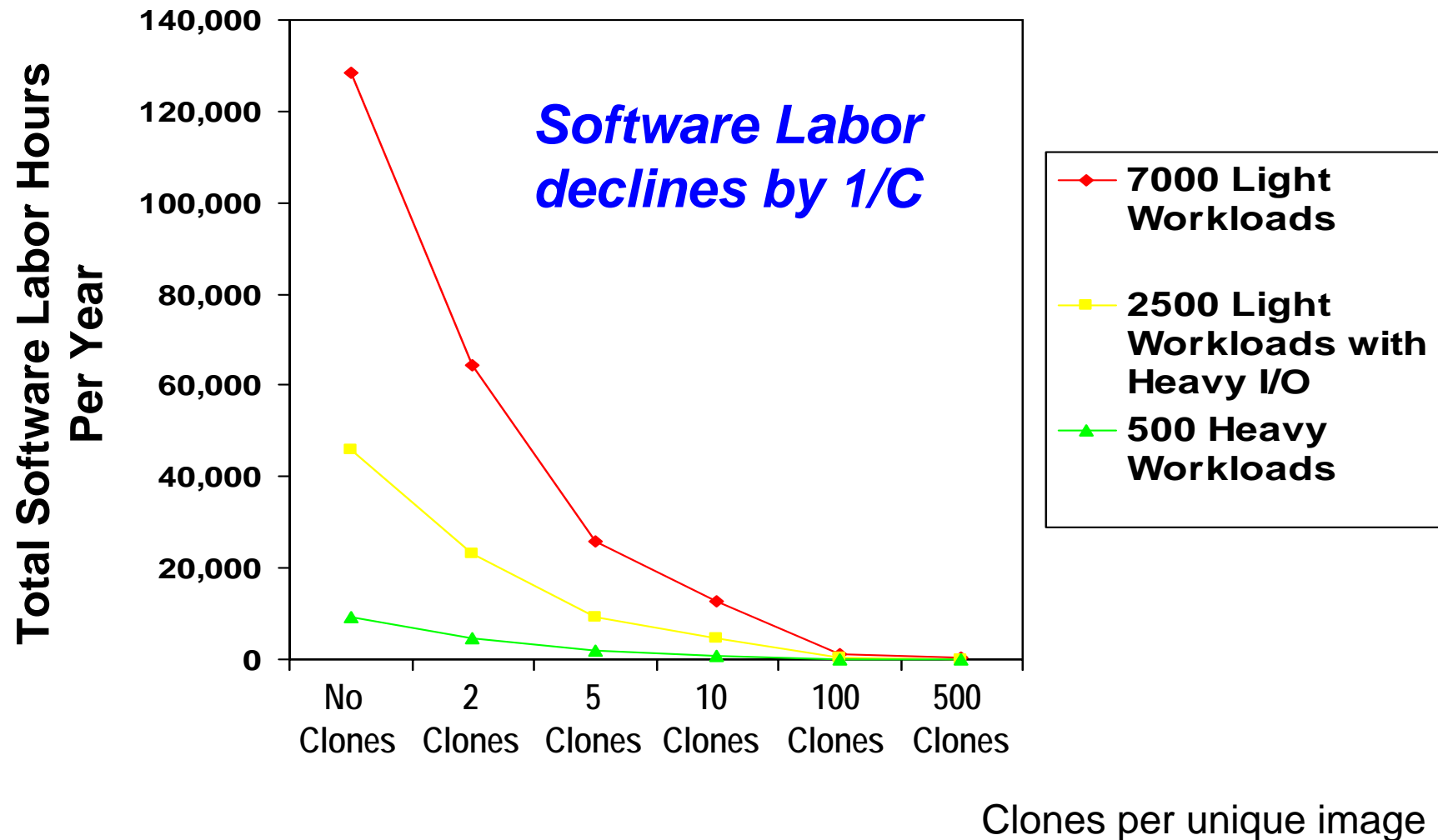


# Standardization

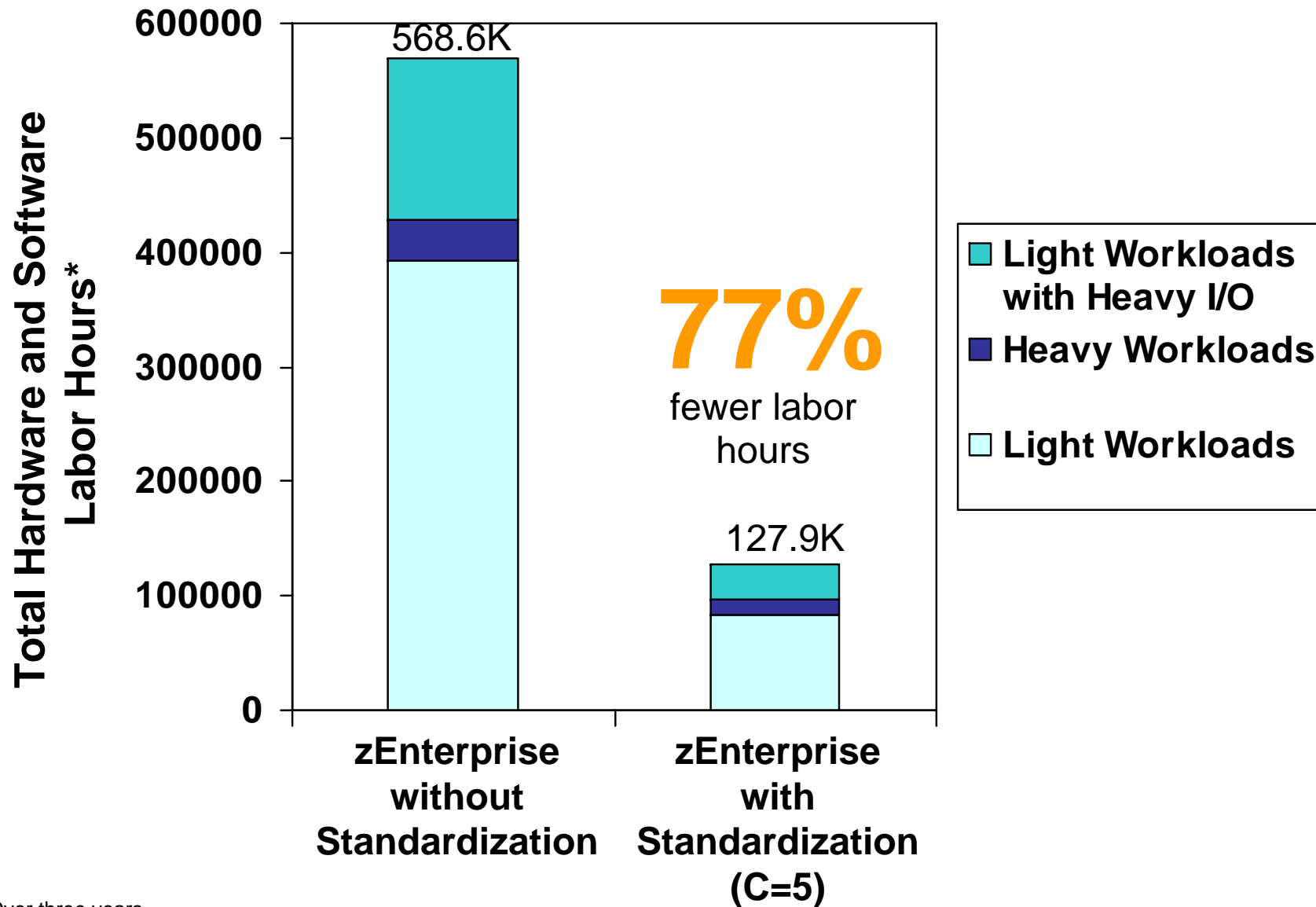
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- A server needs a full set of software to run a workload
  - ▶ Operating System, Middleware, Applications
  - ▶ Patches, configuration specifications
- The combination of all this software is called a “software stack”
- Without controls, the variety of software stacks tends to proliferate, driving up labor costs
  - ▶ Different levels, patches, product selections, etc
- Standardization of Software stacks can reduce labor costs
  - ▶ Uniformity reduces the number of unique stacks to manage
  - ▶ Re-using a standard software stack is called “cloning”

# Benefit Of Cloning Factor On Software Labor Costs In A Virtualized Environment



# Total Hardware and Software Labor Costs for 10,000 Workloads Over 3 Years



\* Over three years



# Total Hardware Labor Hours for zEnterprise

	<u>Deploy/ Release/ Change</u>		<u>Asset</u>		<u>Security</u>		<u>Incident/ Capacity</u>		
<b>7000 Light Workloads</b>	375 hrs	+	920 hrs	+	515 hrs	+	368 hrs	=	2,179 hrs
<b>+</b>									
<b>500 Heavy Workloads</b>	480 hrs	+	1176 hrs	+	659 hrs	+	470 hrs	=	2,785 hrs
<b>+</b>									
<b>2500 Heavy I/O Workloads</b>	490 hrs	+	240 hrs	+	134 hrs	+	96 hrs	=	960 hrs

**zEnterprise  
Server TOTAL**

**BACK-UP ONLY**

**5,924 hrs/yr**

# Standardization Impact on Deployment Labor Costs with C=5 (Detailed Calculations)

	Total HW labor hours		Total SW labor hours	Deploy % of labor	Total unique stacks		
<b>7000 Light Workloads</b>	2,179 hrs	+	36 hr	0.51	$\frac{7000}{5}$	=	27,883 hrs
<b>+</b>							
<b>500 Heavy Workloads</b>	2,785 hrs	+	36 hr	0.51	$\frac{500}{5}$	=	4,621 hrs
<b>+</b>							
<b>2500 Heavy I/O Workloads</b>	960 hrs	+	36 hr	0.51	$\frac{2500}{5}$	=	10,140 hrs

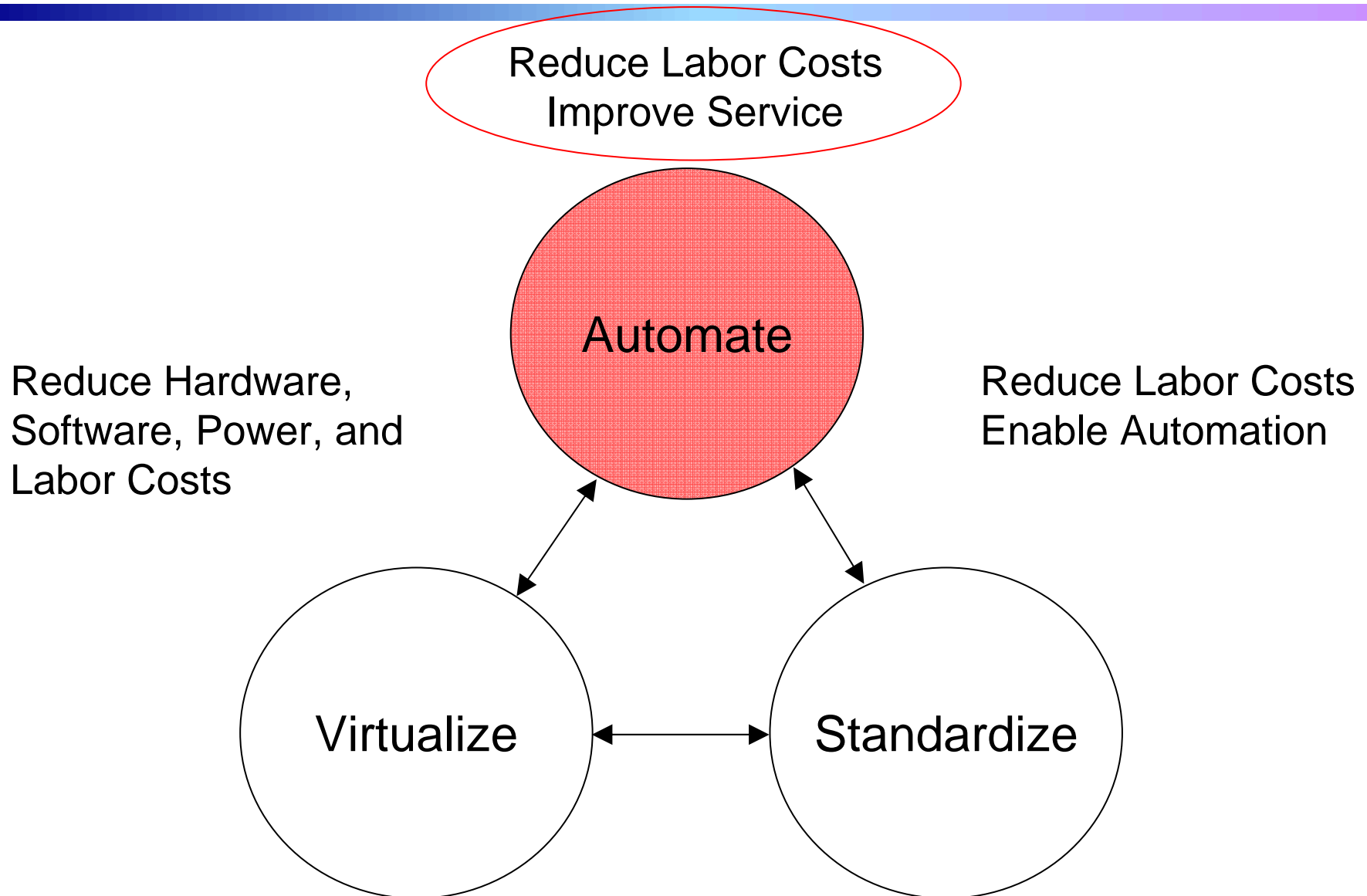
**zEnterprise  
Server TOTAL**

**BACK-UP ONLY**

**42,644 hrs/yr**

# A Virtuous Circle To Reduce I/T Costs

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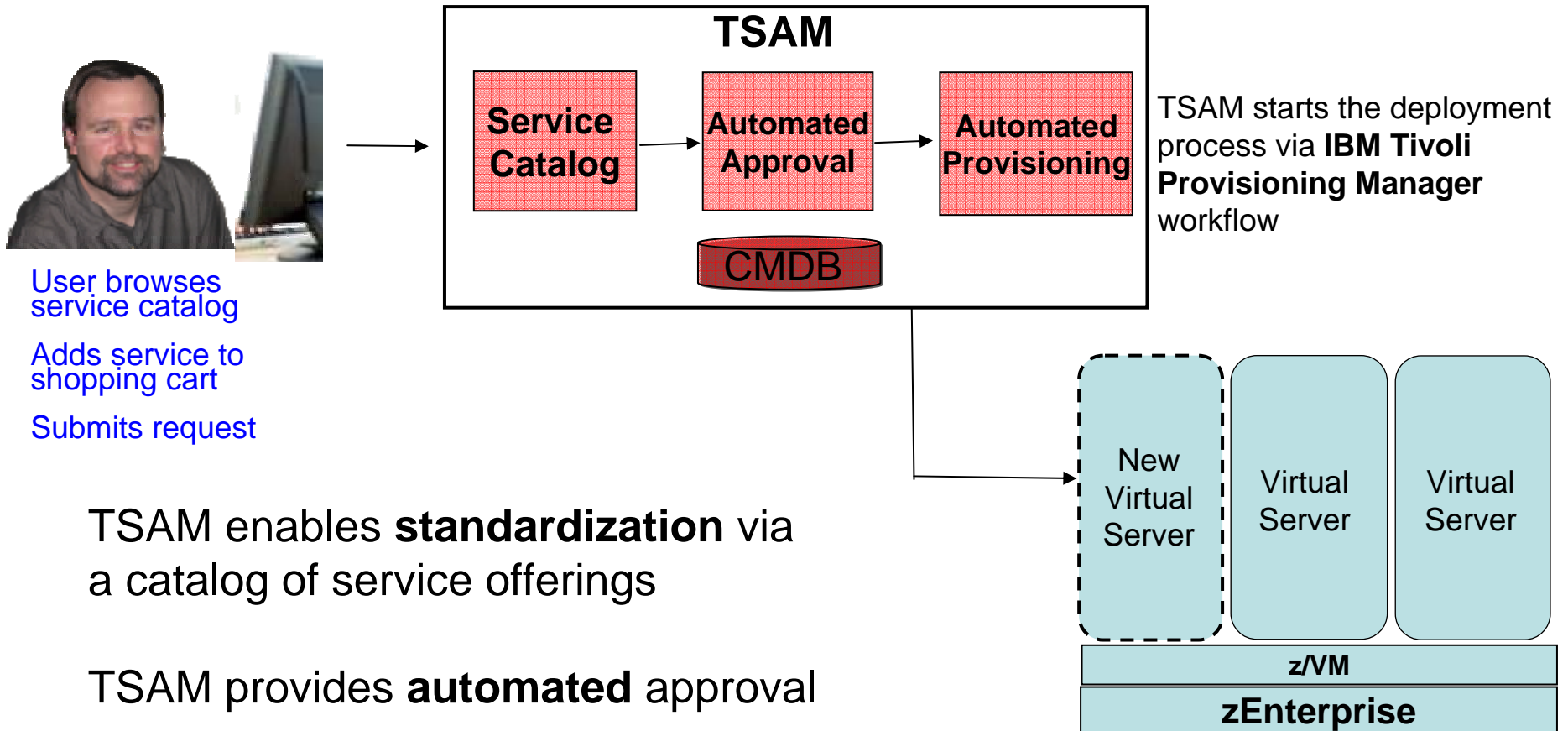
# Service Management is the Key To Automation

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A service management system provides the visibility, control and automation needed for efficient cloud delivery in both public and private implementations:

- Simplify user interaction with IT
  - **Self-service web interface** accelerates time to value
  - **Service catalog** enables menu of standard offerings which reduces costs and drives consistent service delivery
- Automate
  - **Automated provisioning** and de-provisioning speeds service delivery
  - Provisioning **policies** allow release and reuse of assets

# IBM Tivoli Service Automation Manager (TSAM) Delivers Fast Self-Service Provisioning



\*Use TPM alone to provision software stack on p, x on zEnterprise currently

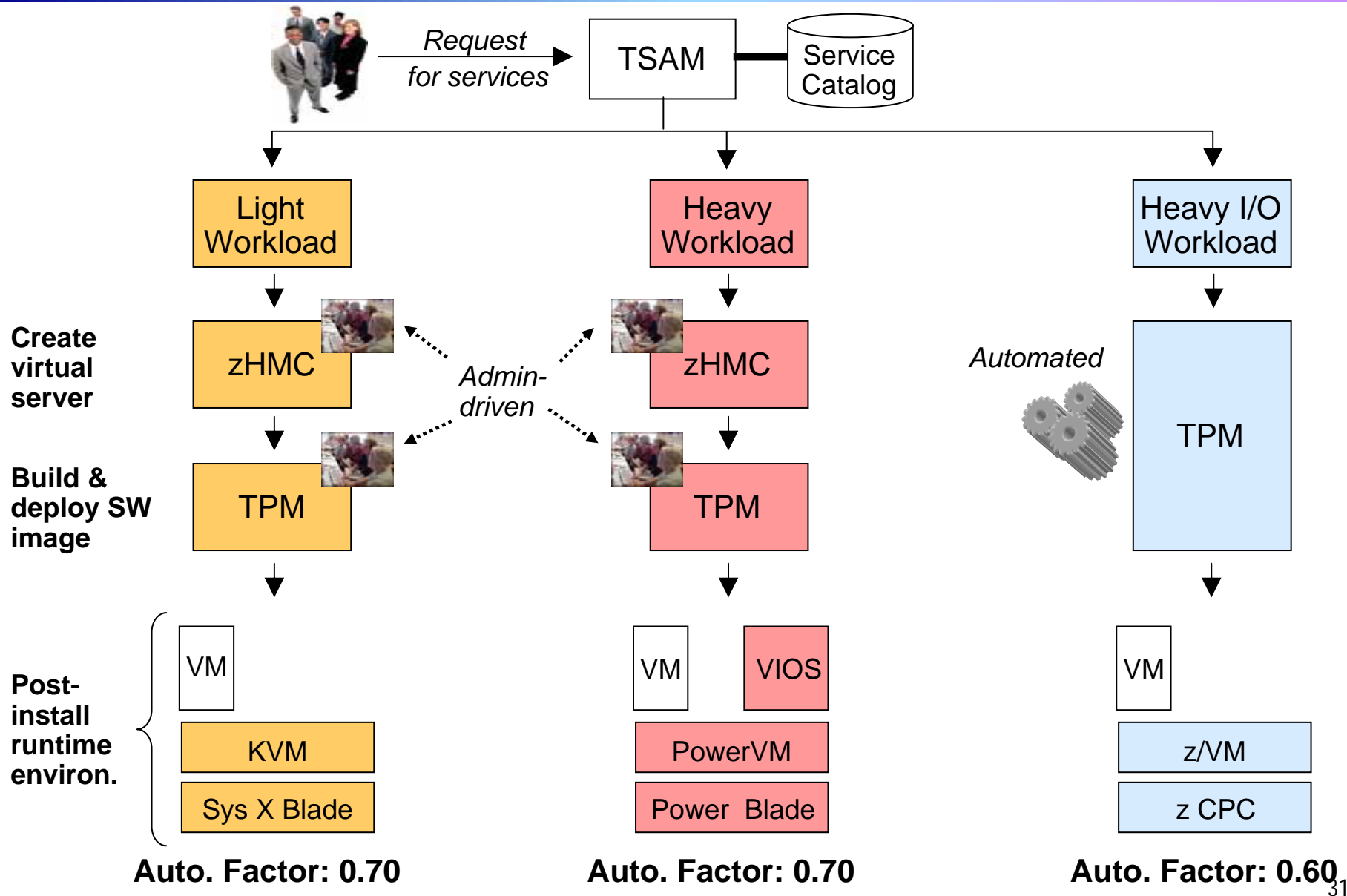
# Respond Quickly By Provisioning With Tivoli Provisioning Manager

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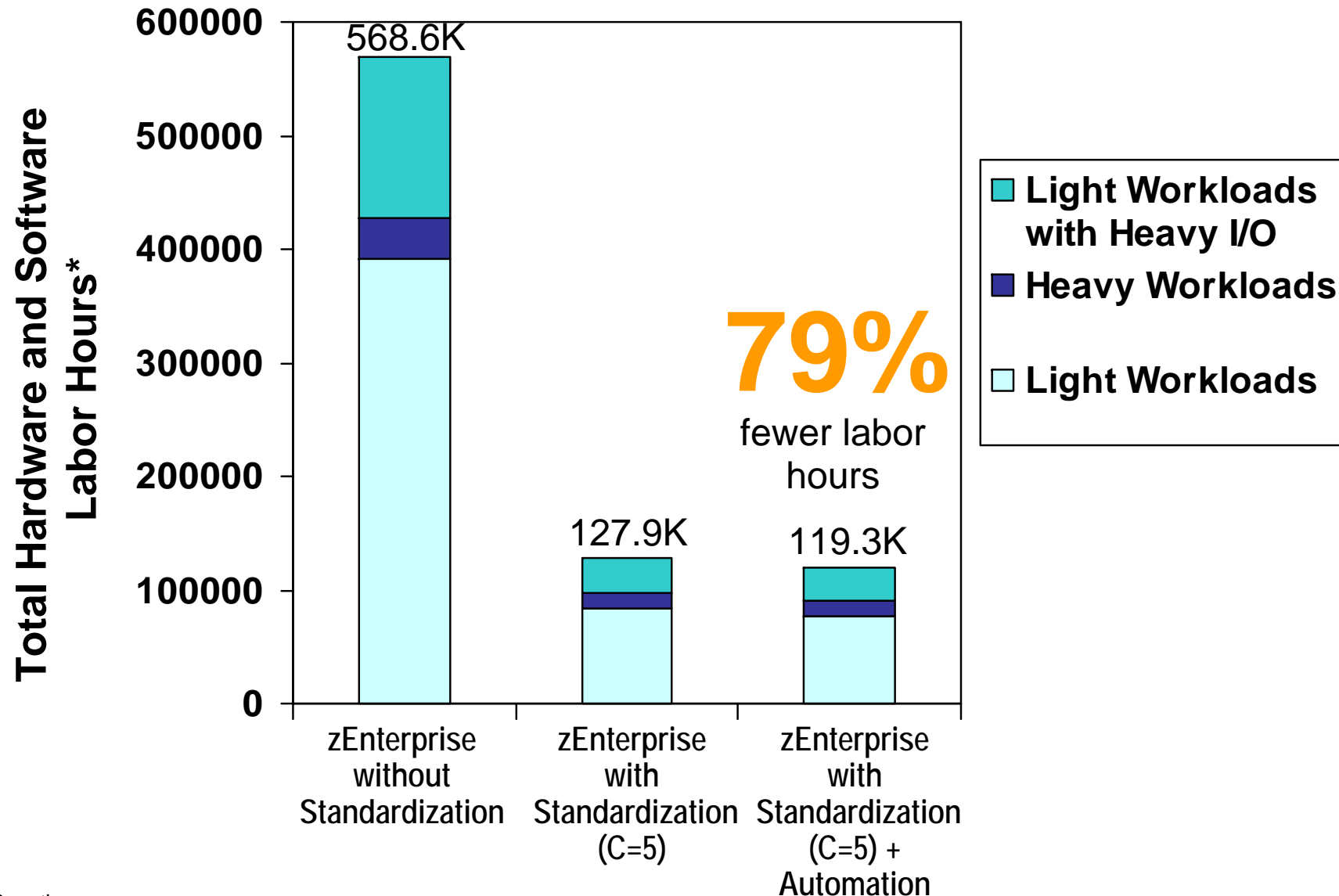
- Virtual image repository allows customers to centralize and standardize on provisioning materials
  - ▶ Images, application packages, configuration properties
- Automates provisioning of virtual machines via cloning from images
- Automates the tasks of installing and configuring software environments on cloned images
- Tasks automated through automation workflows
  - ▶ Pre-built workflows describe provisioning steps
  - ▶ Automation Package Developer allows customization for data center best practices and procedures
  - ▶ Automatic workflow execution with verification at each step

# Deployment Automation Process in zEnterprise (GA1)

**BACK-UP ONLY**



# Total Hardware and Software Labor Costs for 10,000 Workloads Over 3 Years



\* Over three years



# Deployment Labor Costs (Detailed Calculations)

	Total HW labor hours	Total SW labor hours	Deploy/Release/Change % of labor	Total unique stacks	% Deploy labor unaffected by Auto.	Auto. factor	% Deploy labor impacted by Auto.	
<b>7000 Light Workloads</b>	2,179 hrs	+ 36 hr	0.51	$\frac{7000}{5}$	0.74	+ 0.70	0.26	= 25,878 hrs
<b>+ 500 Heavy Workloads</b>	2,785 hrs	+ 36 hr	0.51	$\frac{500}{5}$	0.74	+ 0.70	0.26	= 4,478 hrs
<b>+ 2500 Heavy I/O Workloads</b>	960 hrs	+ 36 hr	0.51	$\frac{2500}{5}$	0.74	+ 0.60	0.26	= 9,424 hrs

**zEnterprise Server TOTAL**

**BACK-UP ONLY**

**39,780 hrs/yr**

# Monitor Consolidated zEnterprise Resources

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- *Tivoli OMEGAMON XE*

- ▶ monitor z/VM and Linux usage of resources such as CPU, network, storage

- *Tivoli Monitoring*

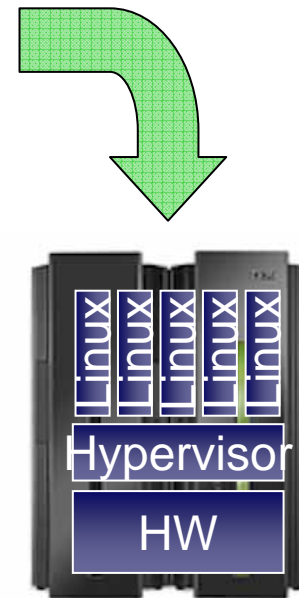
- ▶ Monitor web server applications and Websphere Application Server
- ▶ Monitor messaging environments such as WebSphere MQ and WebSphere Message Broker
- ▶ Monitor database environments such as DB2
- ▶ Monitor collaboration environments such as IBM Lotus Domino

# IBM System z Solution Edition for Cloud Computing



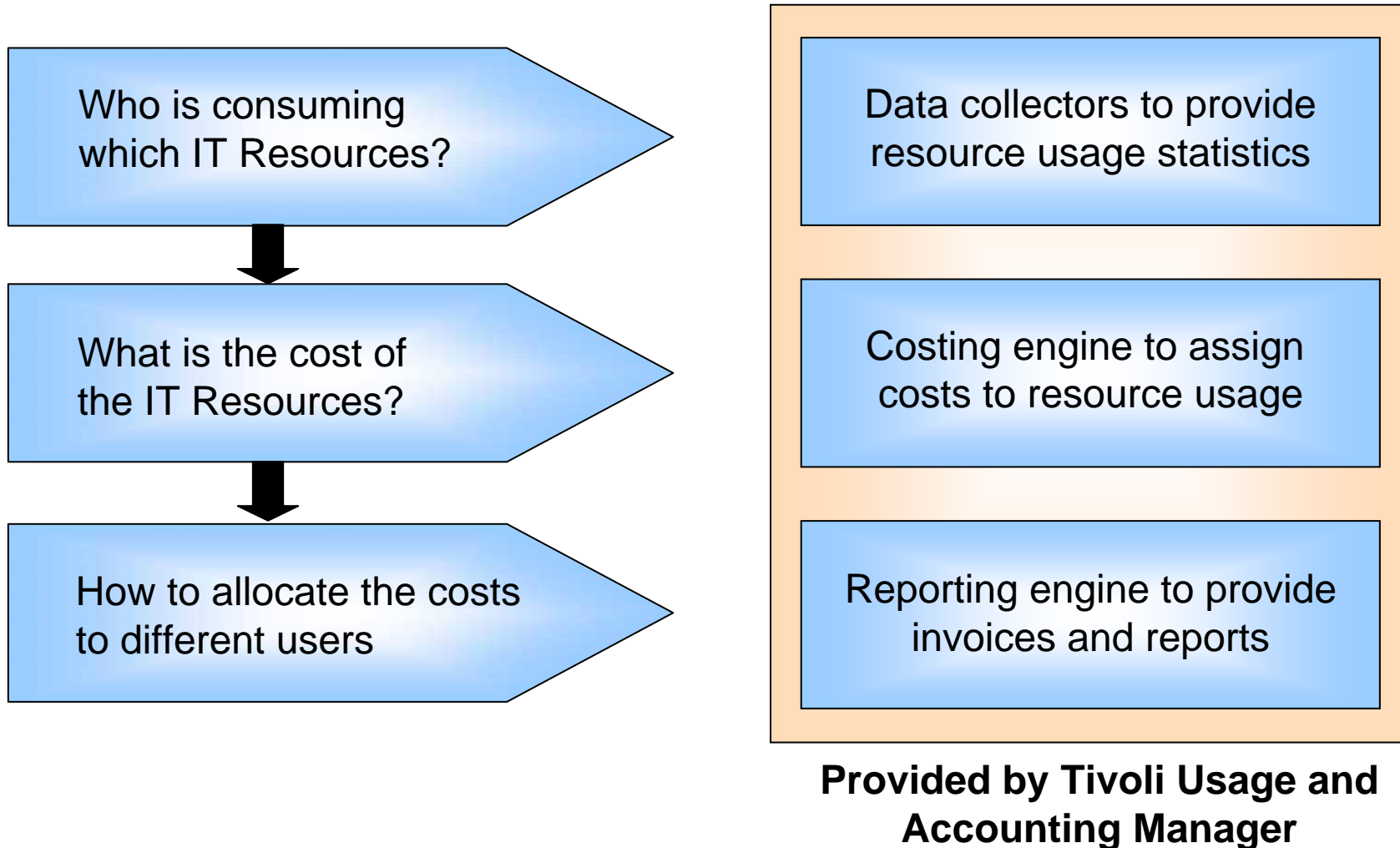
**Builds on the IBM System z Solution Editions For Linux**  
**Adds package of software and services to automate cloud provisioning**

- IBM Tivoli software (runs on zLinux)
  - ▶ Tivoli Service Automation Manager (TSAM) V7.2
  - ▶ TSAM WAS component
  - ▶ Tivoli OMEGAMON XE on z/VM and Linux
  
- IBM Lab Services
  - ▶ Planning , installation, configuring, testing services
  
- Significant package discounts



IBM System z Solution Editions For Linux

# Customers Pay for What They Use In A Private Cloud

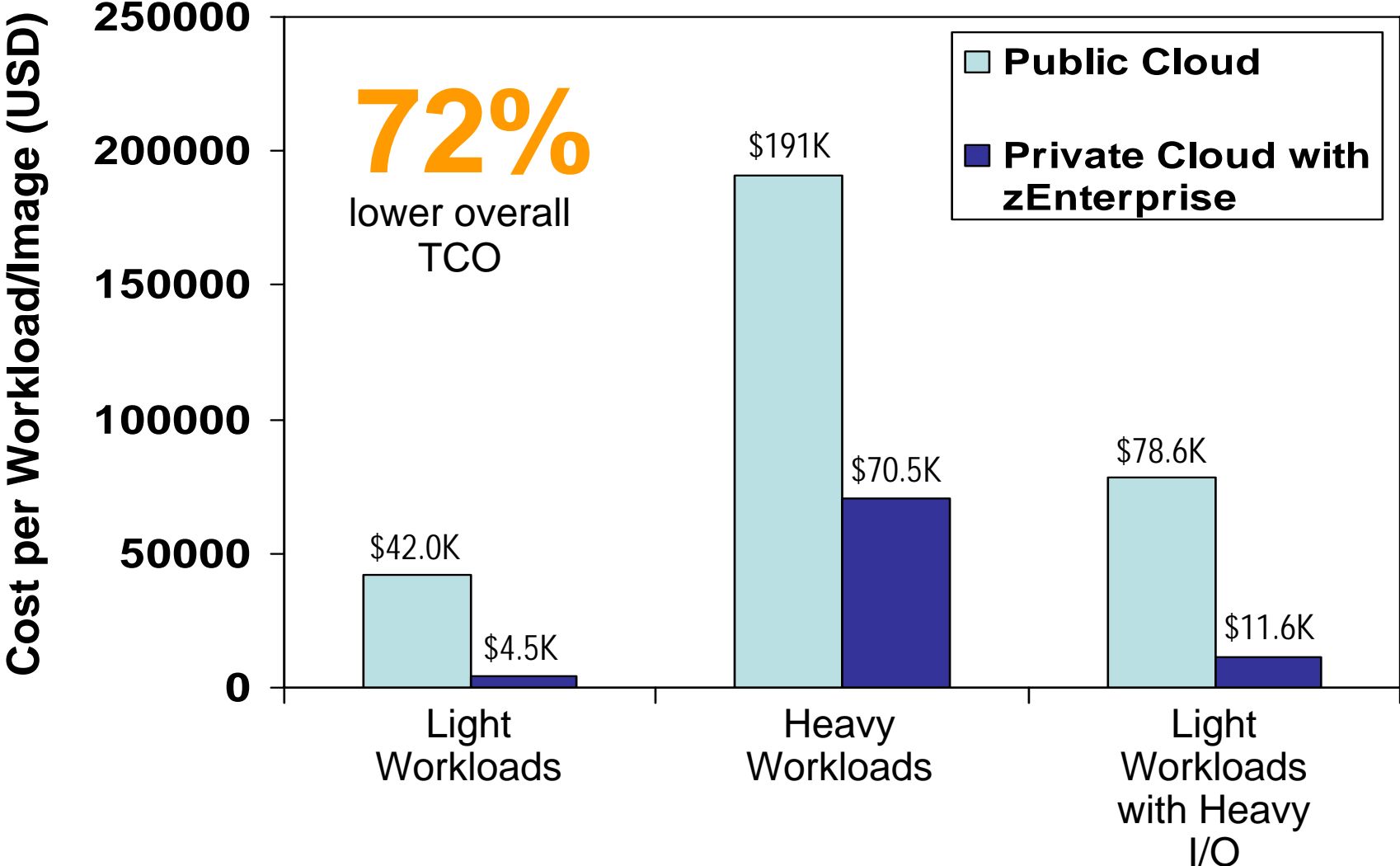


# Tivoli Usage And Accounting Manager

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- Resource usage data collectors
  - ▶ Collectors are available for operating systems, middleware and applications
  - ▶ Uses native utilities to collect and forward usage information
  - ▶ Physical or virtual resources
- Costing engine
  - ▶ Assigns cost equal to usage multiplied by the calculated rate
- Reporting engine
  - ▶ Creates invoices and reports

# Putting It All Together: Hardware, Software, and Administration Costs Per Image (3 Yr TCO)



# Detailed TCO Calculations (3 Years)

		Public Cloud			Private Cloud		
		Light Workload	Heavy Workload	Light Workload with Heavy I/O	Light Workload	Heavy Workload	Light Workload with Heavy I/O
<b>Hardware/ Compute Instance</b>		\$7,629	\$19,621	\$14,400	\$306	\$7,852	\$3,212
<b>Software</b>		\$28,957	\$144,233	\$54,017	\$2,676	\$49,111	\$6,764
<b>Admin</b>	Mgmt. Software*	\$4,690 <i>(ITCAM only)</i>	\$26,264 <i>(ITCAM only)</i>	\$9,380 <i>(ITCAM only)</i>	\$647	\$11,465	\$738
	Labor	\$779	\$779	\$779	\$851	\$2,062	\$868
<b>TOTAL</b> (\$/workload)		<b>\$42,005</b>	<b>\$190,897</b>	<b>\$78,576</b>	<b>\$4,480</b>	<b>\$70,490</b>	<b>\$11,582</b>

**BACK-UP ONLY**

\* Includes TSAM, TUAM, and ITCAM where applicable