# zEnterprise – The Ideal Platform For Smarter Computing

Improving Service Delivery With Private Cloud Computing

# What Users Like About Cloud Computing

- Self-service requests
  - User request services via a web portal
- Fast provisioning
  - Automated provisioning/de-provisioning of resources as needed
- Elastic capability
  - Resource can be elastically provisioned to quickly scale out and rapidly released to quickly scale in
- Low cost pay as you go
  - Users pay for what they use

# But Businesses Have Concerns About Public Clouds

- Lack of Reliability
  - Examples of public cloud outages
    - April 2011, Amazon, 2 days,
    - April 2011, Azure, 6 hours
    - Jan 2011, Salesforce, 1 hour
    - May 2010, Amazon, 4 outages in 1 week
    - April 2010, Azure, 40 mins
    - June 2009, Amazon, 5 hours
    - March 2009, Azure, 22 hours
    - July 2008, Amazon, 5 hours 45 mins
    - Aprll 2008, Amazon, 3 hours
    - Feb 2008, Amazon 2 hours; Salesforce.com, 1 day

*Amazon's Trouble Raises Cloud Computing Doubts*

**April 22,2011 Computerworld**

As technical problems interrupted computer services provided by Amazon for a second day on Friday, industry analysts said the troubles would prompt many companies to reconsider relying on remote computers beyond their control.

- Lack of Security/Compliance
  - 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

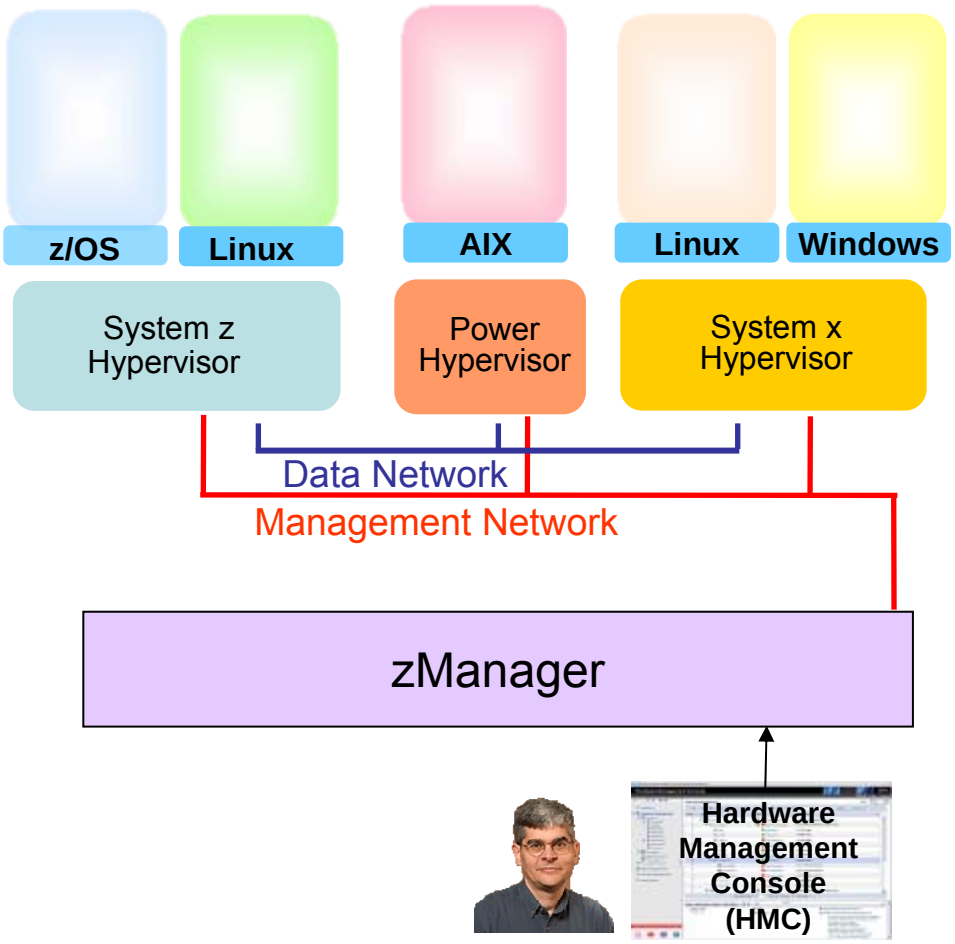
# Transform And Improve Service Delivery With A Private Cloud Instead

- "**Private**" because it is only used by enterprise employees
- Offers same capabilities as a public cloud
  - Virtualization platform with elastic scalability
  - Support for instant provisioning of service
  - Self-service portal to request service
  - Metering and billing capability to support pay as you go model
- But with advantages over a public cloud
  - Multiple architectures
  - Control of security, data protection, availability, and workload management policies
  - Lower cost!

**What Technology is Needed for a Private Cloud?**

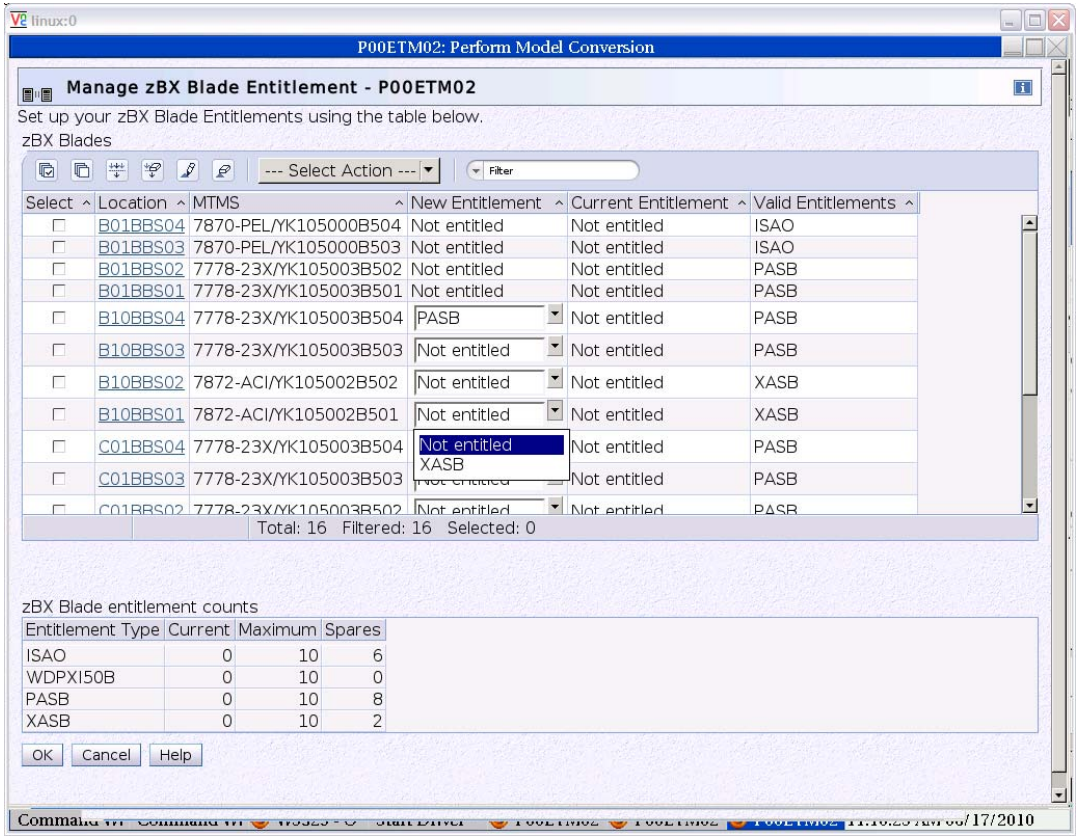
# zEnterprise Provides An Optimized Virtualized Platform

- Multi-architecture virtual environments enable a broad range of workloads
- Elastic Scalability
  - Add processors to z196 while running
  - zManager provides consistent structured management for all virtual environments
    - Add and configure a blade quickly
    - Create virtual machines and networks quickly



# zManager Minimizes Time And Labor For Hypervisor And Network Setup

- Read the entitlements for blades
- Auto-discover and inventory for all elements
  - No need to install and configure libraries or sensors
- Automatic setup and configuration of the hypervisor
- Two internal networks all physically setup out-of-the-box in zBX
  - Pre-configured private and physically isolated internal management network
  - Private and secure data network



# Hypervisor Setup And Configuration Lab Test – Do-It-Yourself vs. zManager

| DIY Tasks (per Blade) | Elapsed Time | Labor Time |
|---|---|---|
| Initial communication setup & education | 6 min 26 sec | 6 min 26 sec |
| Boot VIOS disc & install (creates LPAR for VIOS automatically) | 37 min 59 sec | 36 min |
| Configure VIOS networking | 2 min 49 sec | 2 min 49 sec |
| Create new storage pool for LPARs | 35 sec | 35 sec |
| Install VIOS service fixpacks | 61 min 5 sec | 20 sec |
| **TOTAL TIME** | **1 hr 48 min 52 sec** | **46 min 10 sec** |

| zManager Tasks (per Blade) | Elapsed Time | Labor Time |
|---|---|---|
| Add entitlement for a blade | 90 min | 92 sec |
| **TOTAL TIME** | **1 hr 30 min** | **1 min 32 sec** |

**97%** reduction in labor time

Source: IBM CPO Internal Study

# Network Setup And Configuration Lab Test – Do-It-Yourself vs. zManager

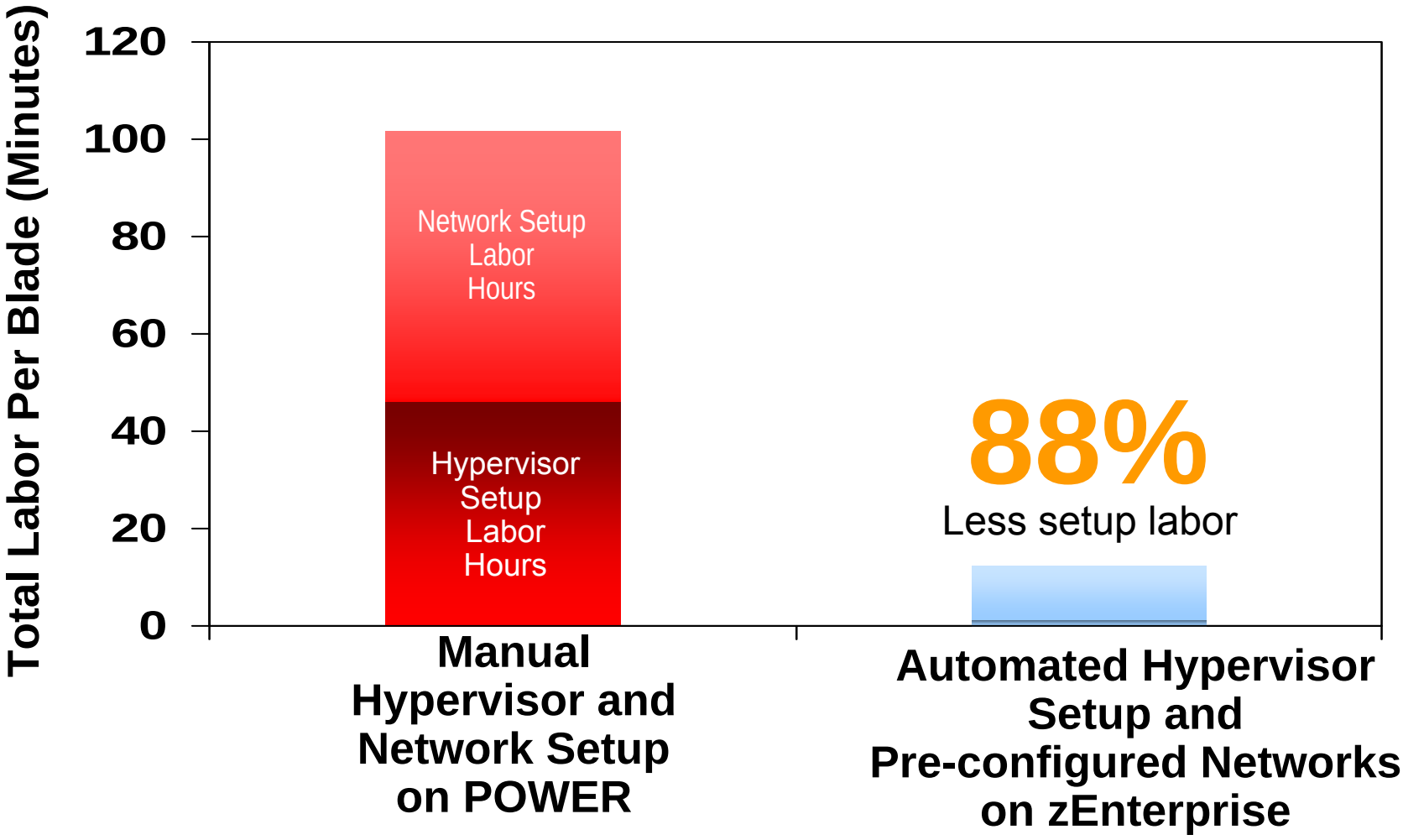
| Do-It-Yourself Tasks (for two BladeCenters) | Elapsed/Labor Time |
|---|---|
| Planning (includes time to go over docs, etc) | 5 hrs |
| Cabling | 2 hrs |
| AMM Configuration | 2 hrs |
| Logical Configuration (L2) | 8 hrs |
| Blades network configuration | 4 hrs |
| Testing | 2 hrs |
| Documenting the configuration | 3 hrs |
| **TOTAL TIME** | **26 hrs** |

| zManager Tasks (for two BladeCenters) | Elapsed/Labor Time |
|---|---|
| Planning | 3 hrs |
| Cabling (pre-cabled in zBX) | 0 hrs |
| AMM Configuration (done in zBX) | 0 hrs |
| Logical configuration (L2) | 30 mins |
| Blades network configuration | 1 hr 30 mins |
| Testing (pre-tested) | 0 hrs |
| Documenting the configuration (all part of zManager) | 0 hrs |
| **TOTAL TIME** | **5 hrs** |

**81%** reduction in labor time

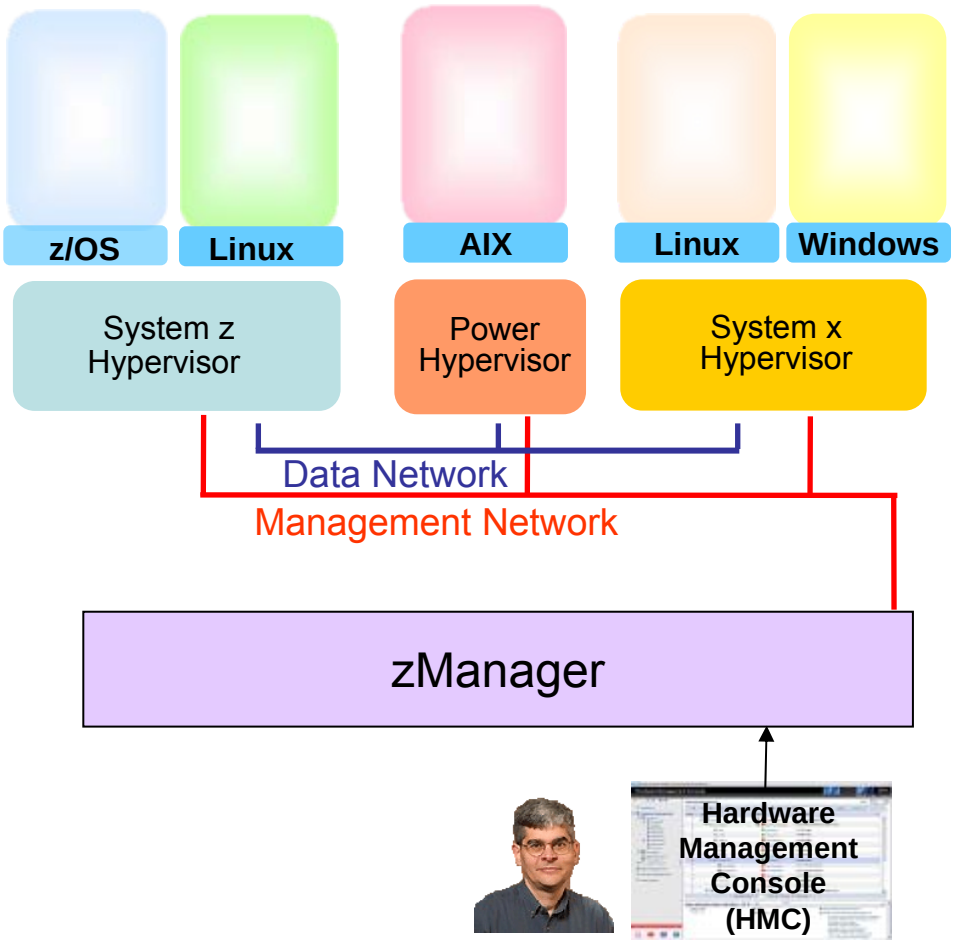
Source: IBM CPO Internal Study

# Automated Hypervisor Setup And Pre-configured Network Enable Fast Platform Scale Up



# Manage Virtual Servers With zManager

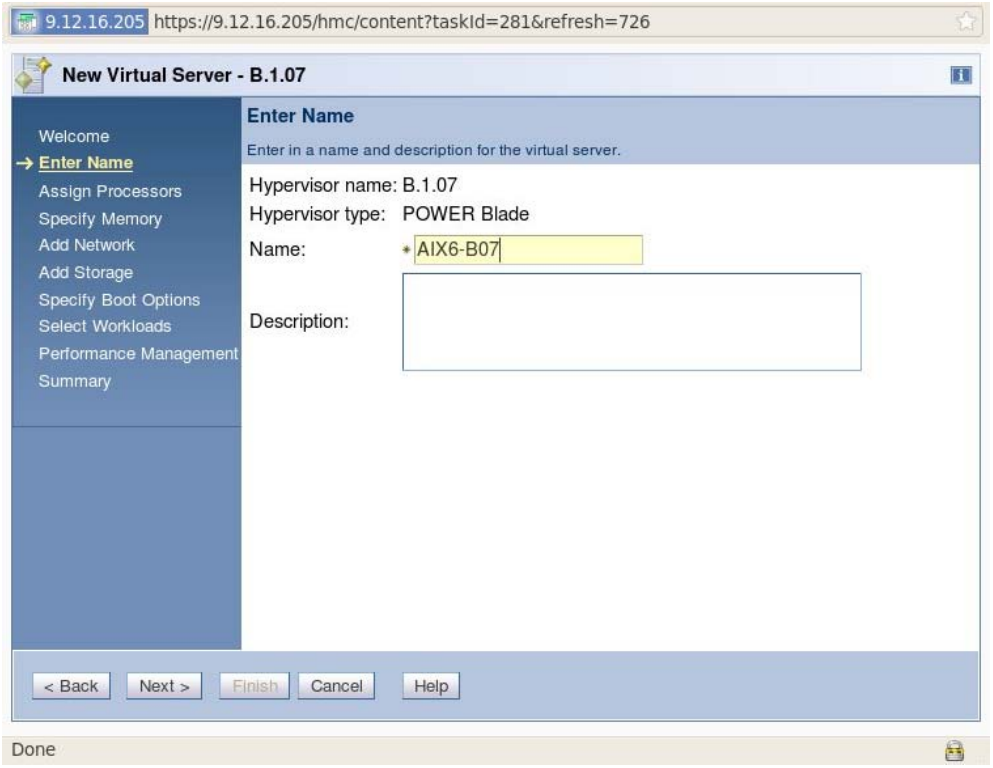
- From one console, create virtual machines in z/VM and in zBX hypervisors
- Start / stop / delete virtual machines under zManager control
- Create virtual networks
- Monitor resource usage
  - CPU, Memory, Power consumption



# DEMO: Create Virtual Server With zManager

Create virtual server on a Power blade

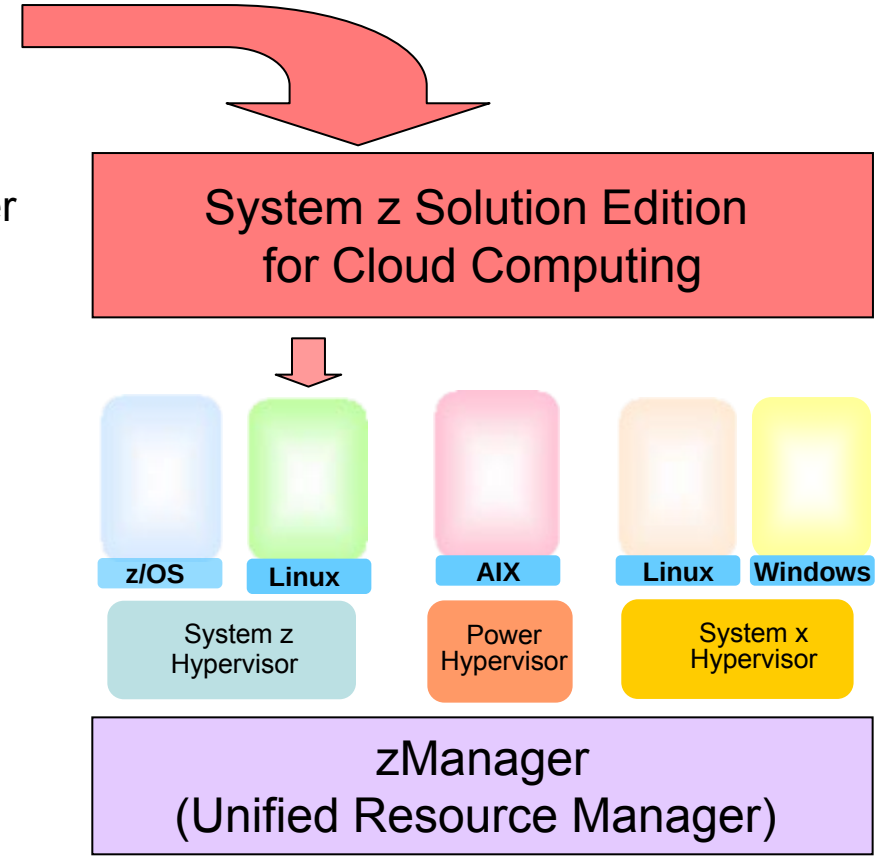
- Enter name for virtual server
- Assign number of virtual processors
- Specify memory
- Add network device
- Add storage device
- Specify boot option
- Select workload



# IBM System z Solution Edition For Cloud Computing

**Adds package of software and services for self-service provisioning, chargeback and monitoring**

- IBM Tivoli software (runs on Linux on System z)
  - Self-service provisioning
    - Tivoli Service Automation Manager (TSAM)
  - Chargeback
    - Tivoli Usage and Accounting Manager (TUAM)
  - Monitoring
    - Tivoli OMEGAMON XE on z/VM and Linux
- IBM Lab Services
  - Planning, installation, configuring, testing services
  - Significant package discounts

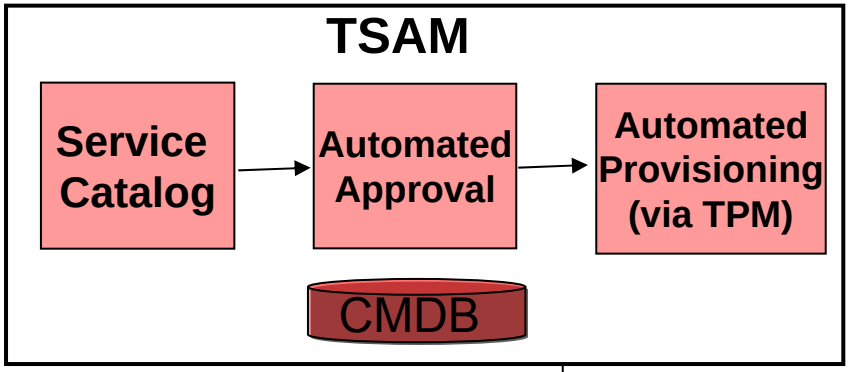


# Self-Service Provisioning With Tivoli Service Automation Manager (TSAM)

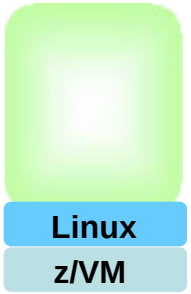
User browses service catalog

Adds service to shopping cart

Submits request




TSAM starts the deployment process via **IBM Tivoli Provisioning Manager** (TPM) workflow




- Self-service portal for users
- Enables standardization via a catalog of service offerings
- Automates request processing with pre-defined workflows
- Fast provisioning of virtual servers

# TSAM Uses Tivoli Provisioning Manager (TPM) To Provision A Virtual Server

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

# Self-Service Provisioning For zEnterprise

*Request for services*

**Tivoli Service Automation Manager (TSAM)**

Service Catalog

*Administrator*

***Automated Out-of-the-box***

*Administrator*

HCM/ zHMC/ DFS

Tivoli Provisioning Manager (TPM)

zManager (zHMC)

NIM

Tivoli Provisioning Manager (TPM)

z/OS

z/VM

AIX

Win

Linux

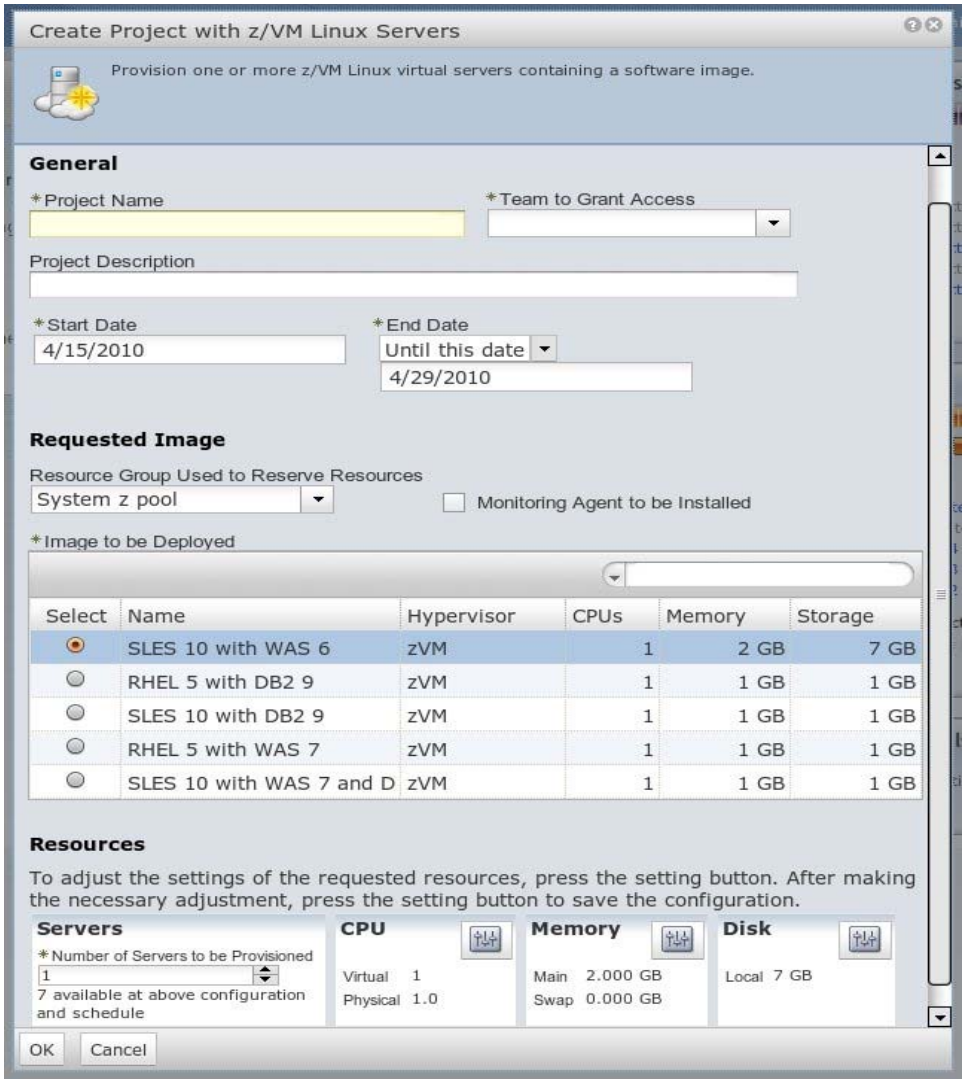
System z Hypervisor

Power Hypervisor

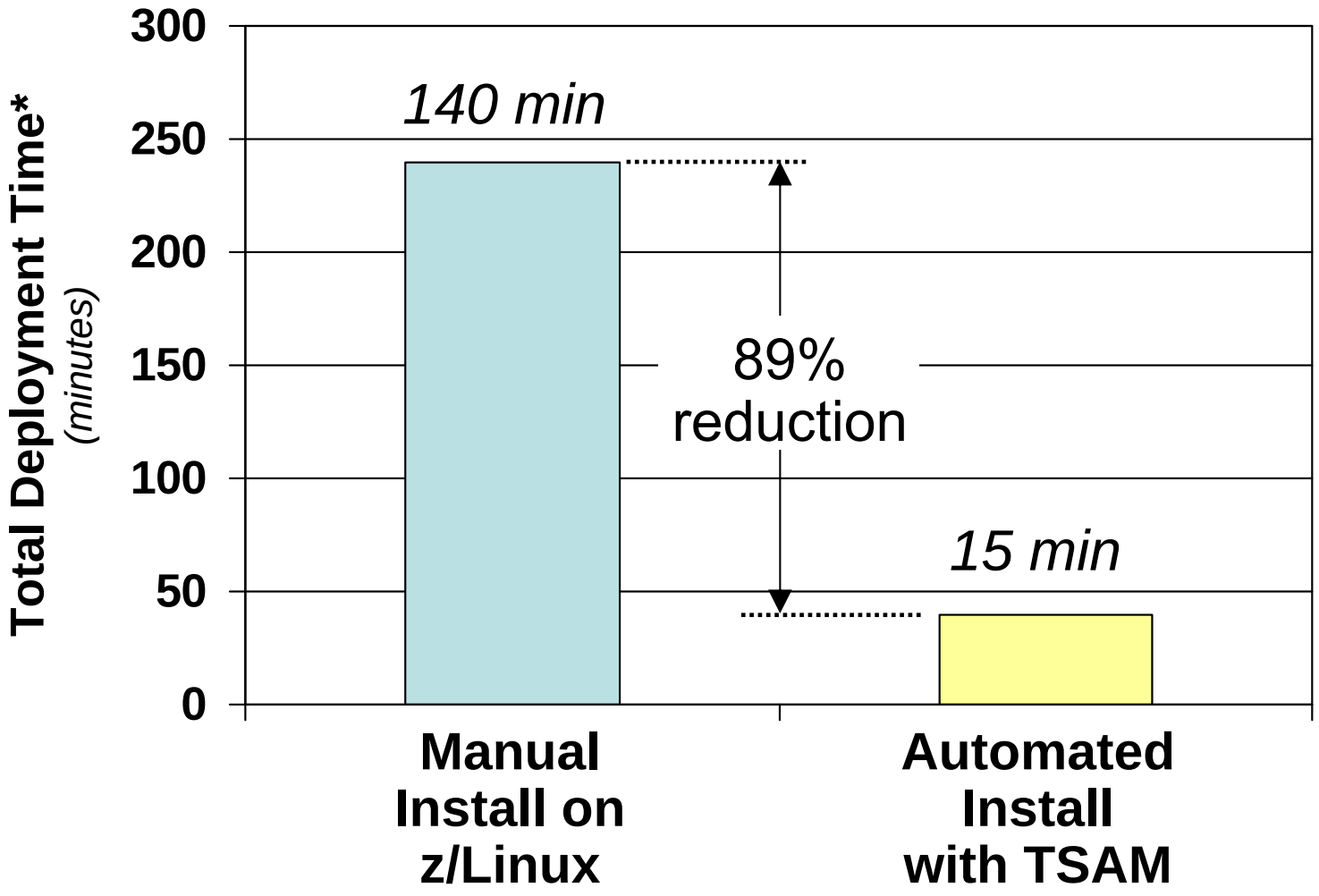
System x Hypervisor

# DEMO: Self-Service Provisioning With IBM Tivoli Service Automation Manager (TSAM)

- Submit a request to add a new virtual machine (VM) under z/VM to an existing project
- VM created with a complete software stack (zLinux, WebSphere, customer application and Tivoli Monitoring agent) installed
- Requester is notified via email when the request is completed

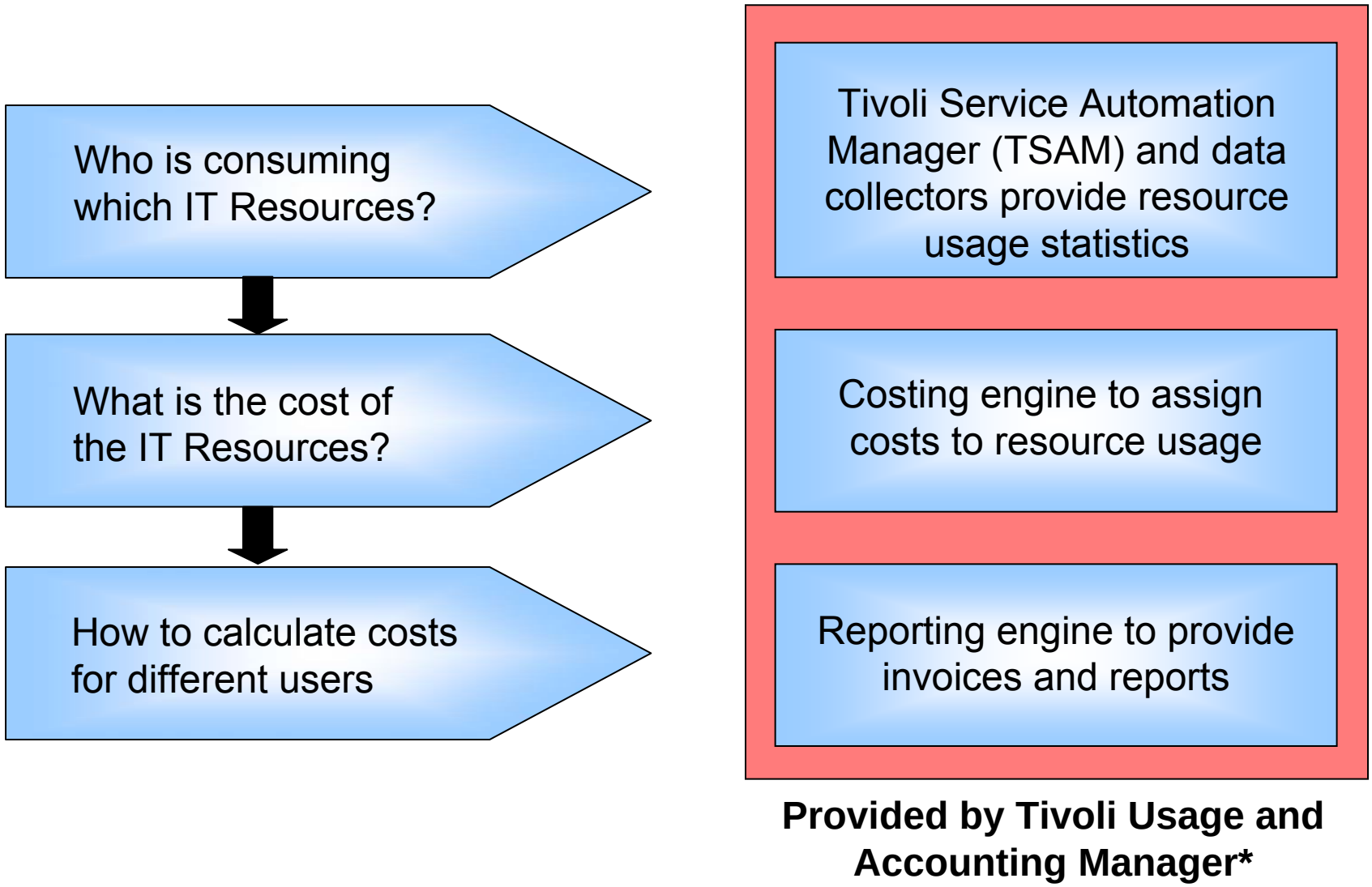


# TSAM Automated Provisioning Is Fast




* Excluding network transmission time

# Pay-As-You-Go Chargeback With Tivoli Usage And Accounting Manager (TUAM)



# Public vs. Private Cloud: Which Option Costs Less For Delivering Mixed Workloads?

***Which option provides the lowest TCO over 3 years?***

Light Intel workloads

400 workloads

Heavy Unix workloads

42 workloads

Light workloads with heavy I/O

408 workloads

**850 workloads**

Public Cloud

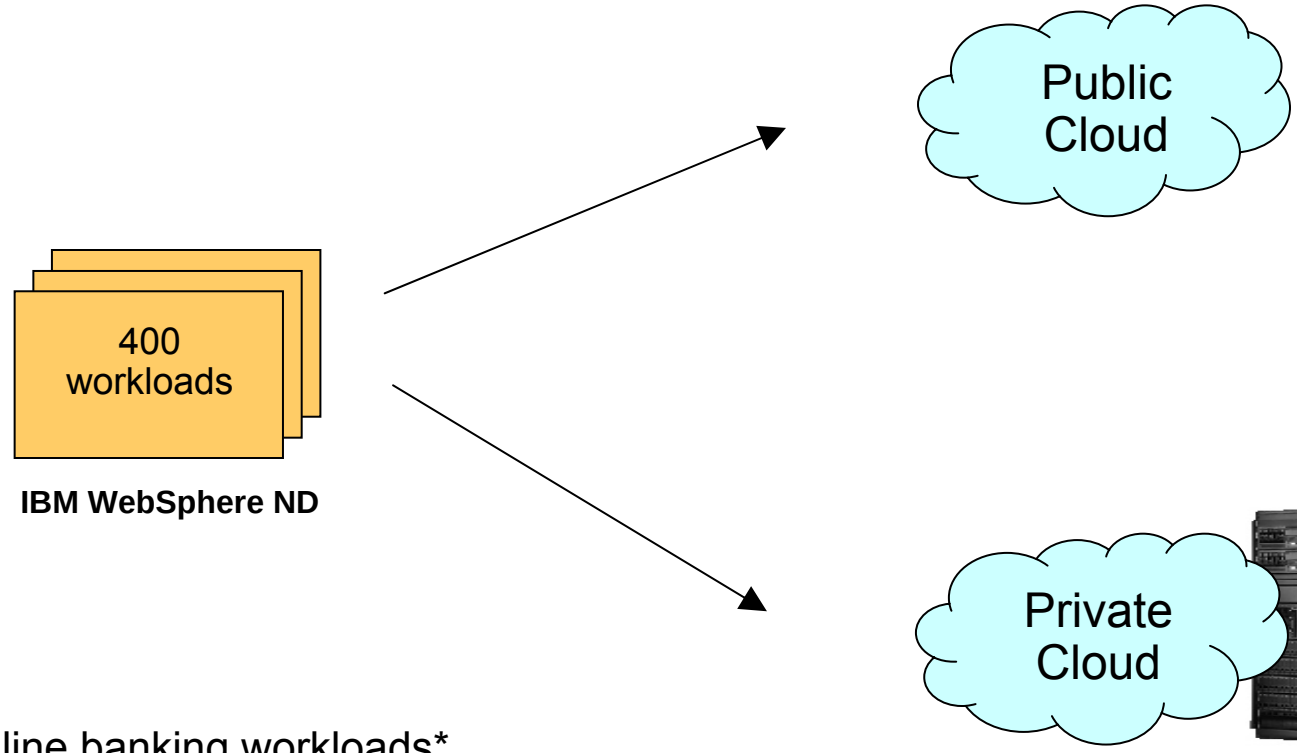
Private Cloud

zEnterprise

# Variability In Image Usage Allows For Reduction In The Number Of Servers Required

- 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

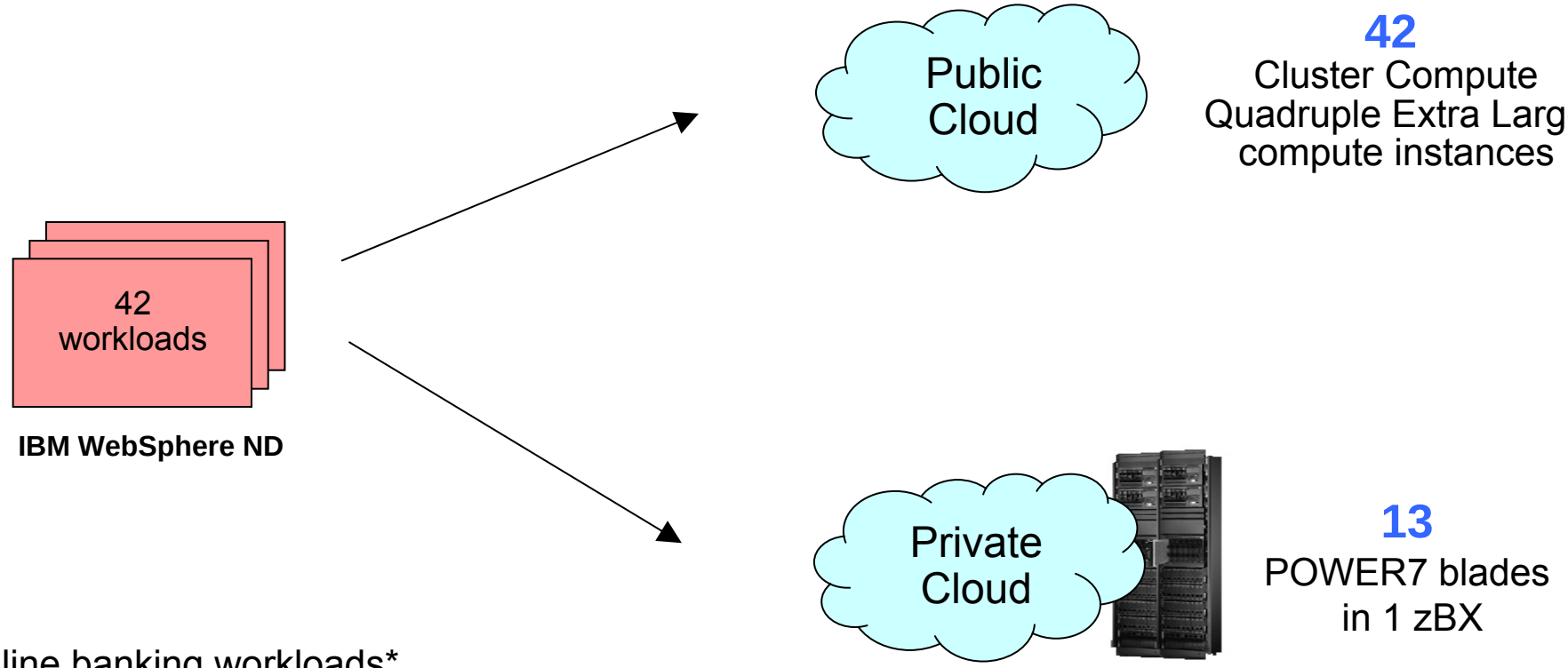
# Deploying Light Workloads




Online banking workloads*, each driving **22** transactions per second with light I/O

* CPO on-line banking benchmark

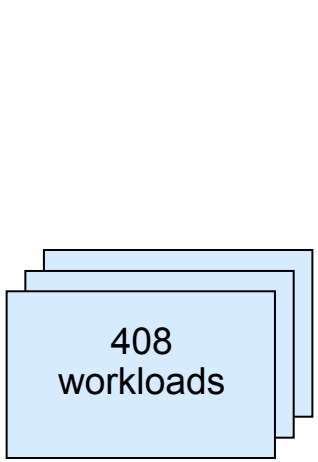
# Deploying Heavy CPU Workloads With Light I/O




Online banking workloads*, each driving **460** transactions per second 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**

Public Cloud

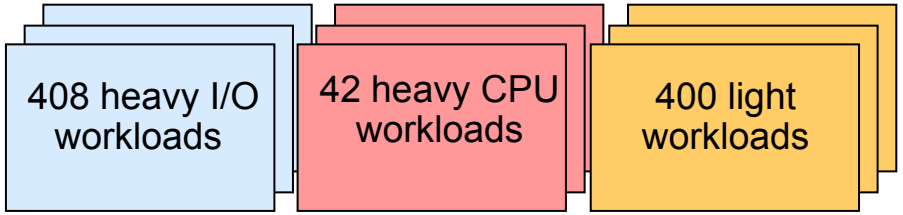
**408**
Extra large compute instances

Private Cloud

1
zEnterprise CPC
(32 IFLs total)

* CPO on-line banking benchmark

# Compare Cost Of Acquisition For 3 Years




Deployed on public cloud

Public Cloud

**850 Compute Instances**

**$56.2M** (3yr TCA)

Optimized on zEnterprise

Private Cloud

**zEnterprise**

**32 IFL's, 7 Intel blades,13 Power blades**

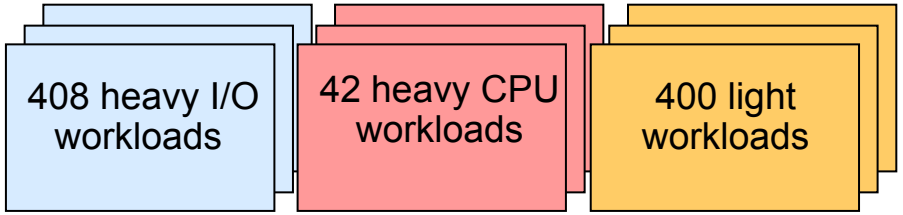
**192 cores**

**$10.8M** (3yr TCA)

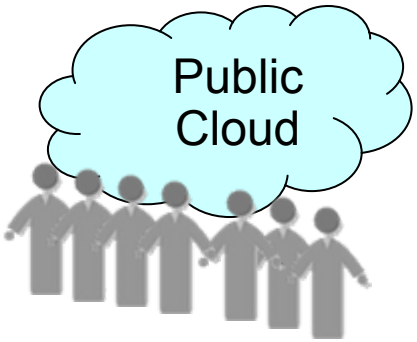
**81% less**

Server configurations are based on consolidation ratios derived from IBM internal studies. Prices are in US currency and will vary by country

# Compare Labor Costs For 3 Years




Deployed on public cloud




23,929 labor hours/yr

**11.5** administrators

**$5.51M**

3 years @ $159,600/yr

Optimized on zEnterprise


17,470 labor hours/yr

**8.4** administrators

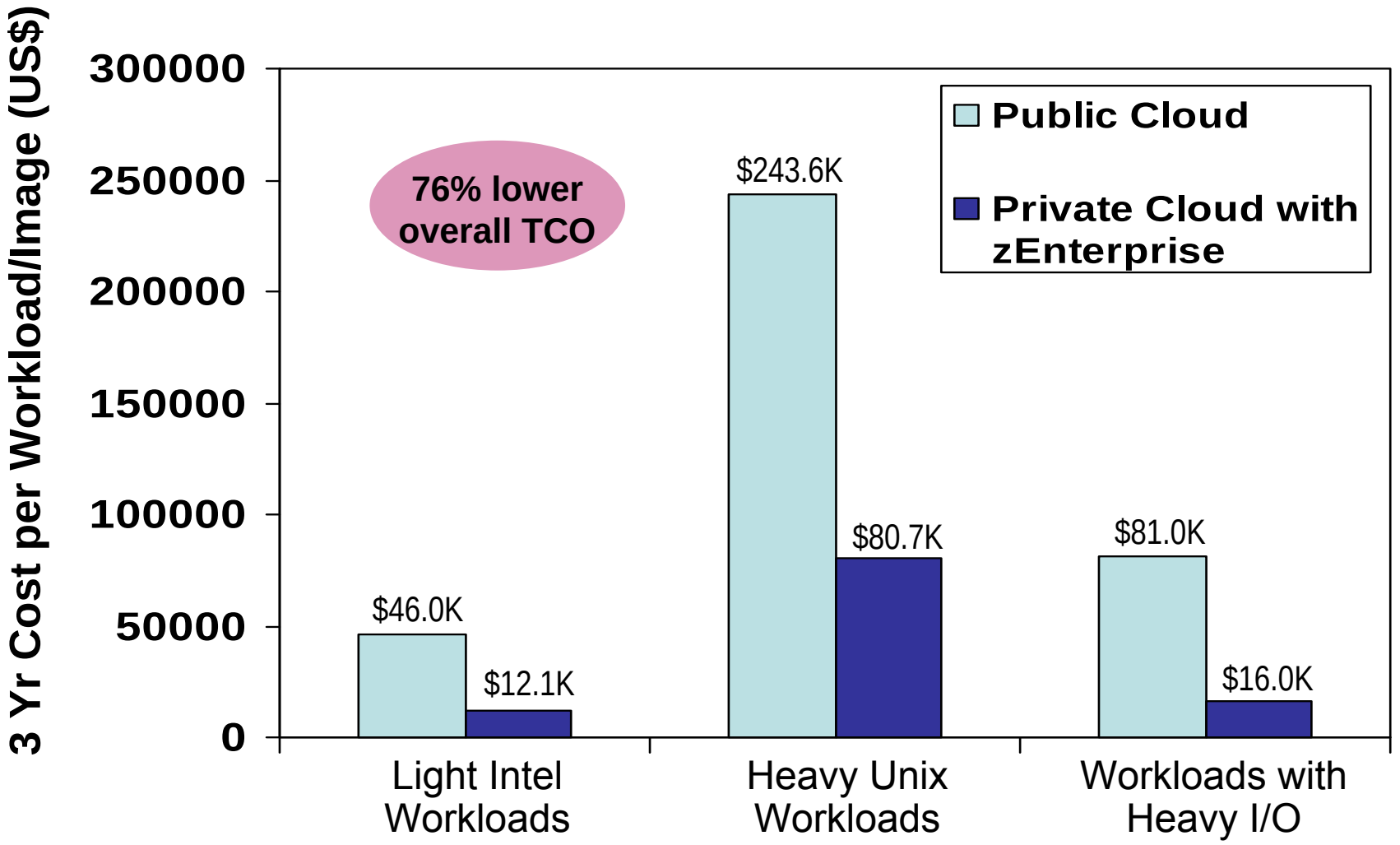
**$4.02M**

3 years @ $159,600/yr

**27% less**

Server configurations are based on consolidation ratios derived from IBM internal studies. Prices are in US currency and will vary by country

# Private Cloud On zEnterprise Dramatically Reduces Costs




Source: IBM internal study. zEnterprise configurations needed to support the three workload types were derived from IBM benchmarks. 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.

# What Users Get With zEnterprise Private Cloud

- Self-service requests
  - User request services via a web portal
- Fast provisioning
  - Automated provisioning/de-provisioning of resources as needed
- Elastic capability
  - Resource can be elastically provisioned to quickly scale out and rapidly released to quickly scale in
- Low cost pay as you go
  - Users pay for what they use
  - Business saves a lot of money