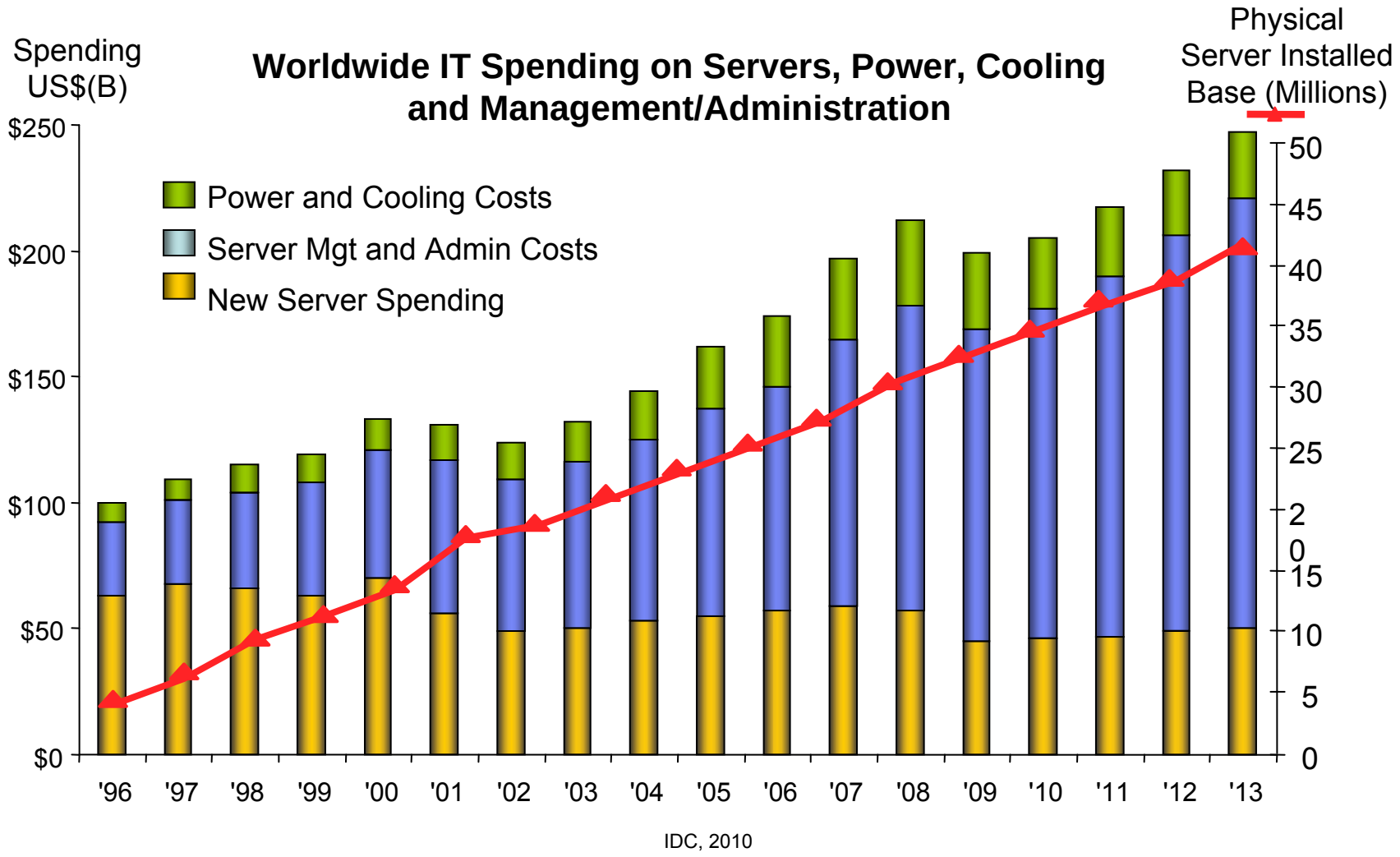
zEnterprise – The Ideal Platform For Smarter Computing

Improving Service Delivery With Private Cloud Computing

IT Labor Costs Continue To Increase



Deliver Services Via Cloud To Reduce Labor Costs

- 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

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?

Improve Service Delivery With A Private Cloud On zEnterprise And Reduce Costs

Virtualization Platform

Enterprise Linux Server Solution Edition for Enterprise Linux

BladeCenter Extension (zBX)

Unified Resource Manager (zManager)

Multi-architecture virtual environment

Elasticity

Entry Cloud

zEnterprise Cloud Starter Edition

Automated provisioning

Resource monitoring

Advanced Cloud

System z Solution Edition for Cloud Computing

Self-service

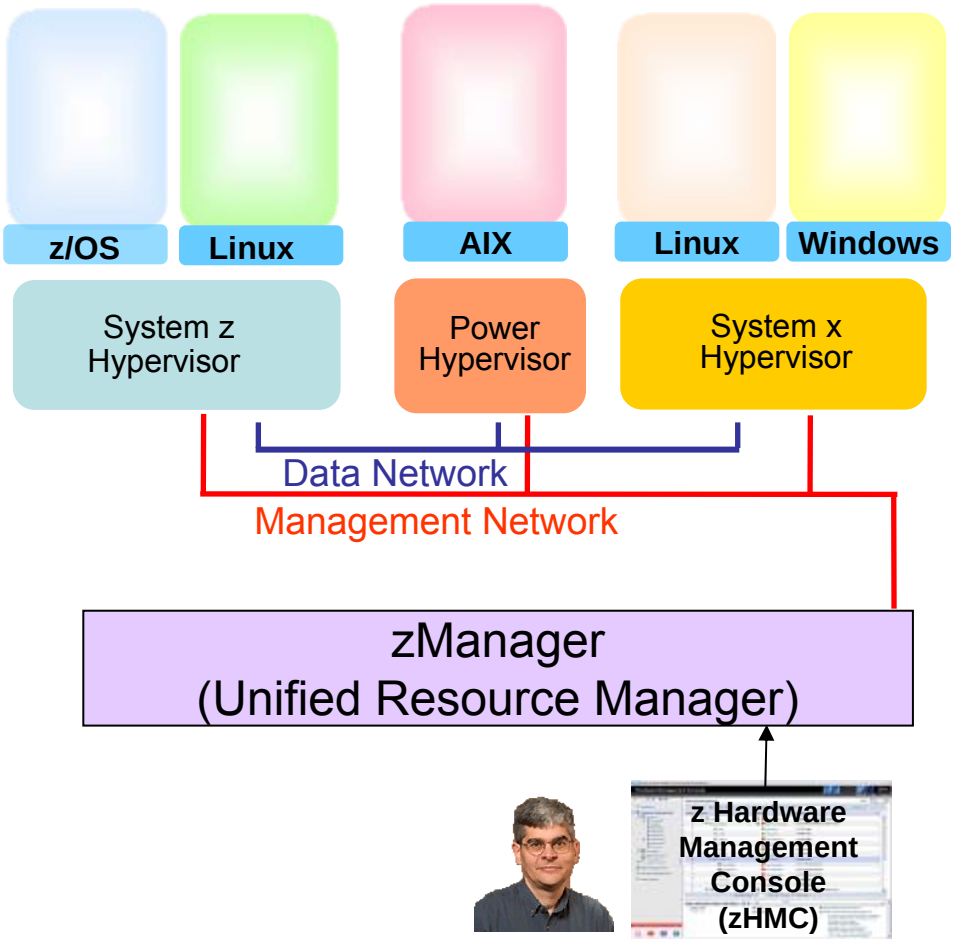
Automated provisioning

Resource monitoring

Metering and billing

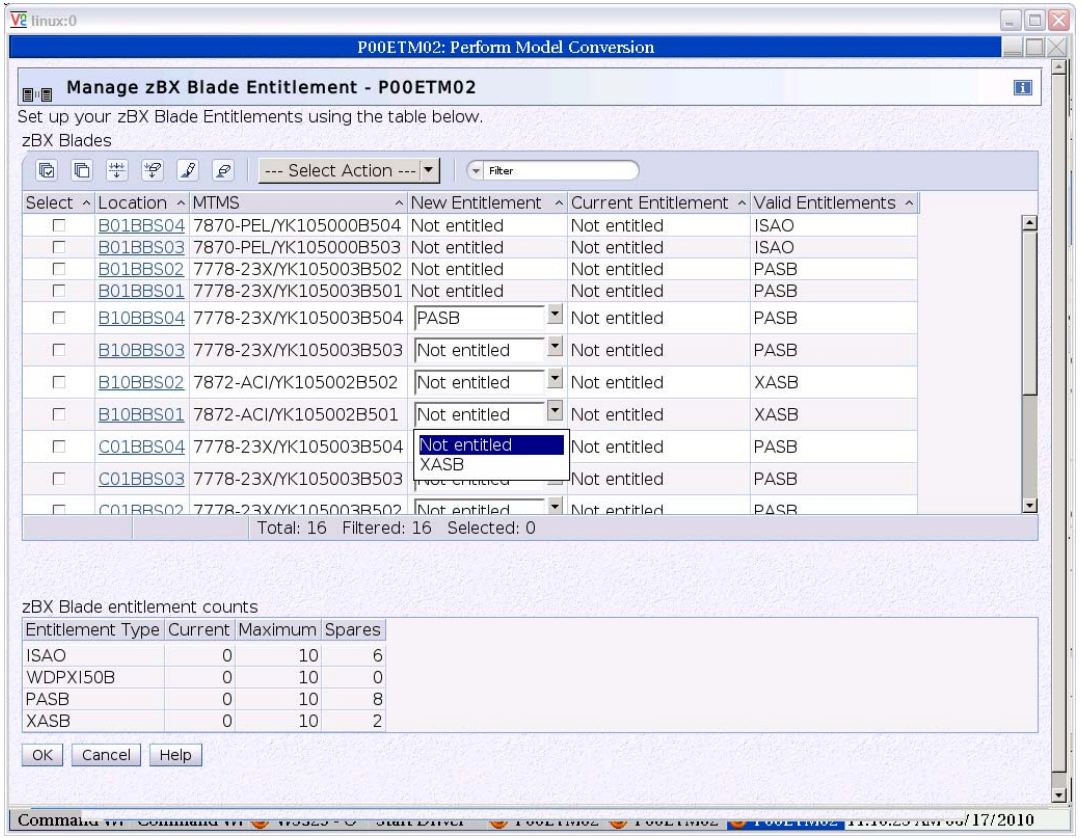
zEnterprise Provides An Optimized Virtualized Platform

- Multi-architecture virtual environments enable a broad range of workloads
- Elastic Scalability
  - Add processors to z114 / 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

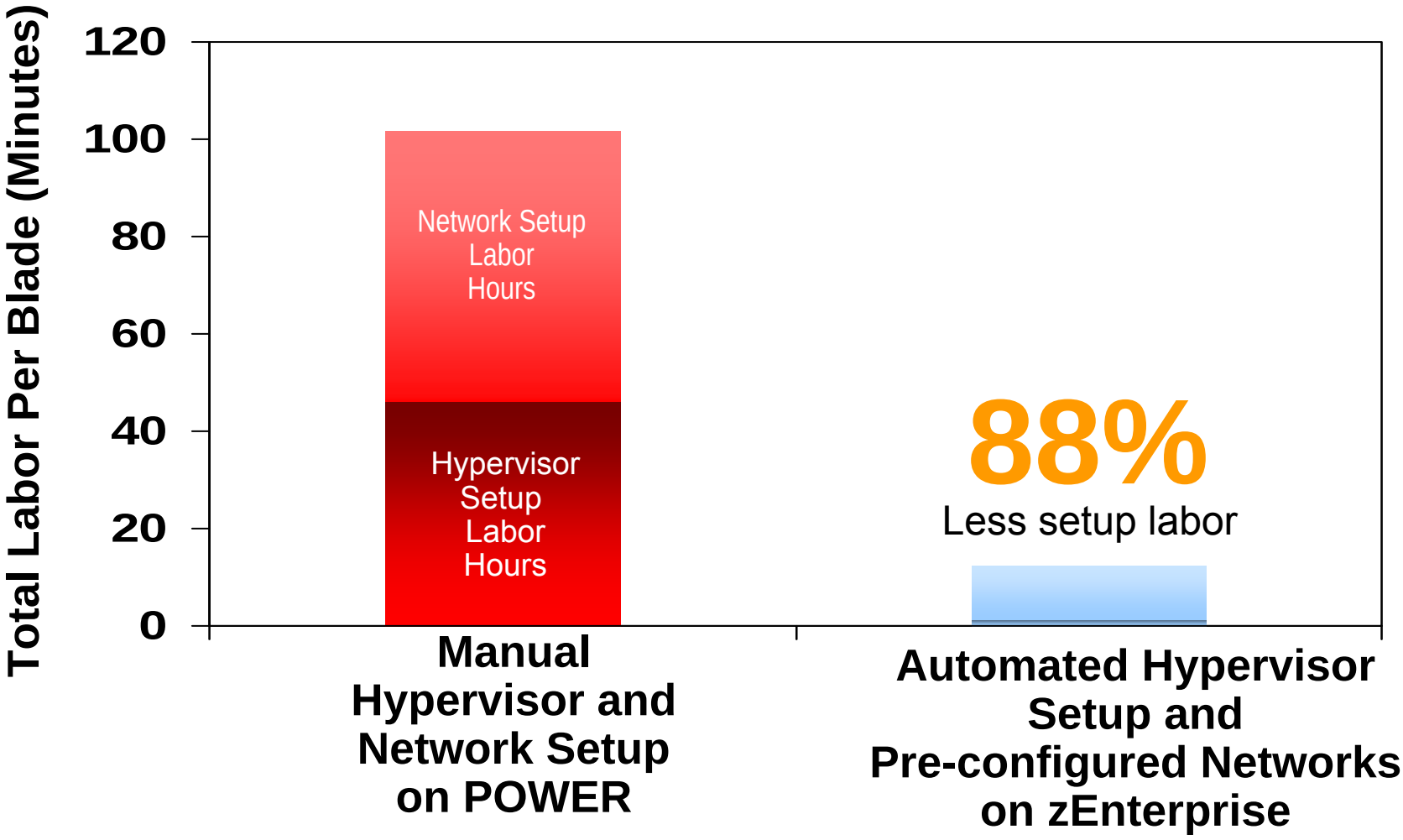
Do-It-Yourself Tasks (for two BladeCenters)	Elapsed/Labor Time
Planning (includes time to go over docs, etc)	5 hrs
Cabling	2 hrs
AMM Configuration	2 hrs
Logical Configuration (L2)	8 hrs
Blades network configuration	4 hrs
Testing	2 hrs
Documenting the configuration	3 hrs
TOTAL TIME	**26 hrs**

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

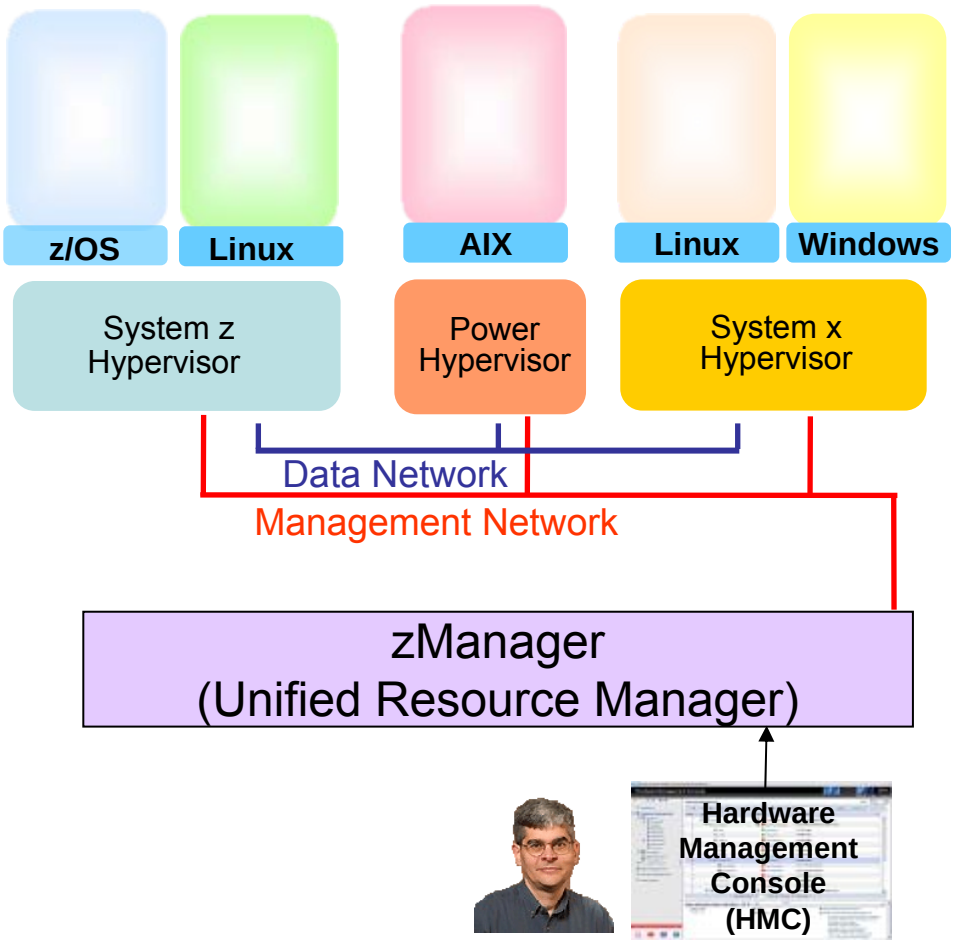
Source: IBM CPO Internal Study

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



Manage Virtual Servers With zManager

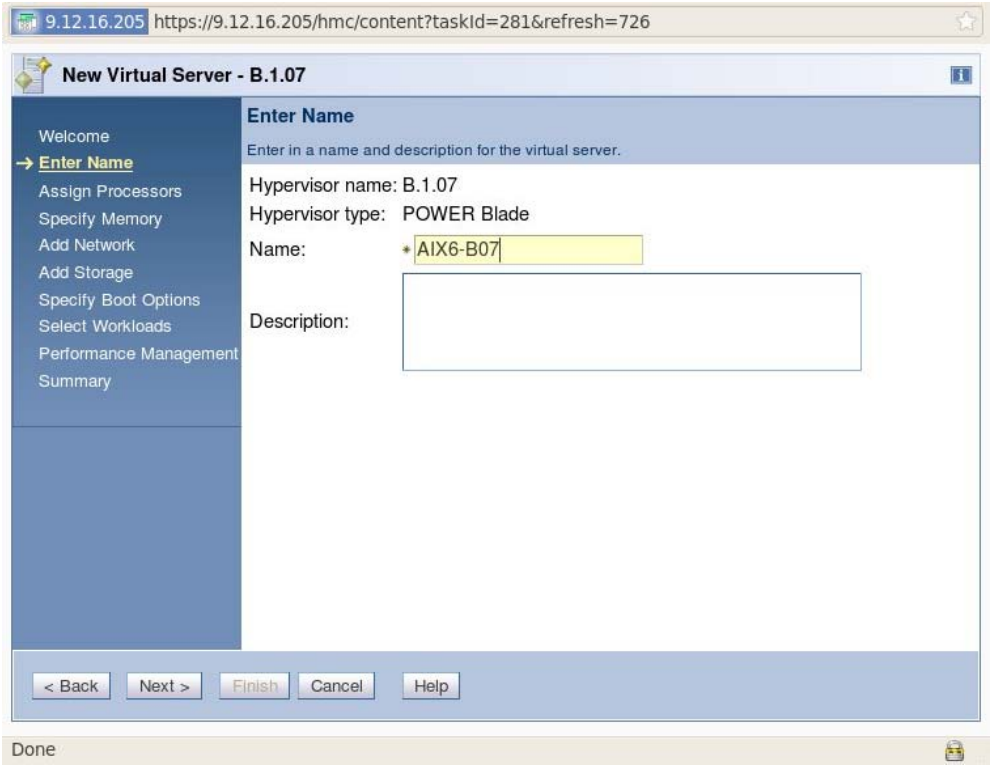
- From one console, create virtual machines in z/VM and in zBX hypervisors
- Start / stop / delete virtual machines under zManager control
- Create virtual networks
- Monitor resource usage
  - CPU, Memory, Power consumption



DEMO: Create Virtual Server With zManager

Create virtual server on a Power blade

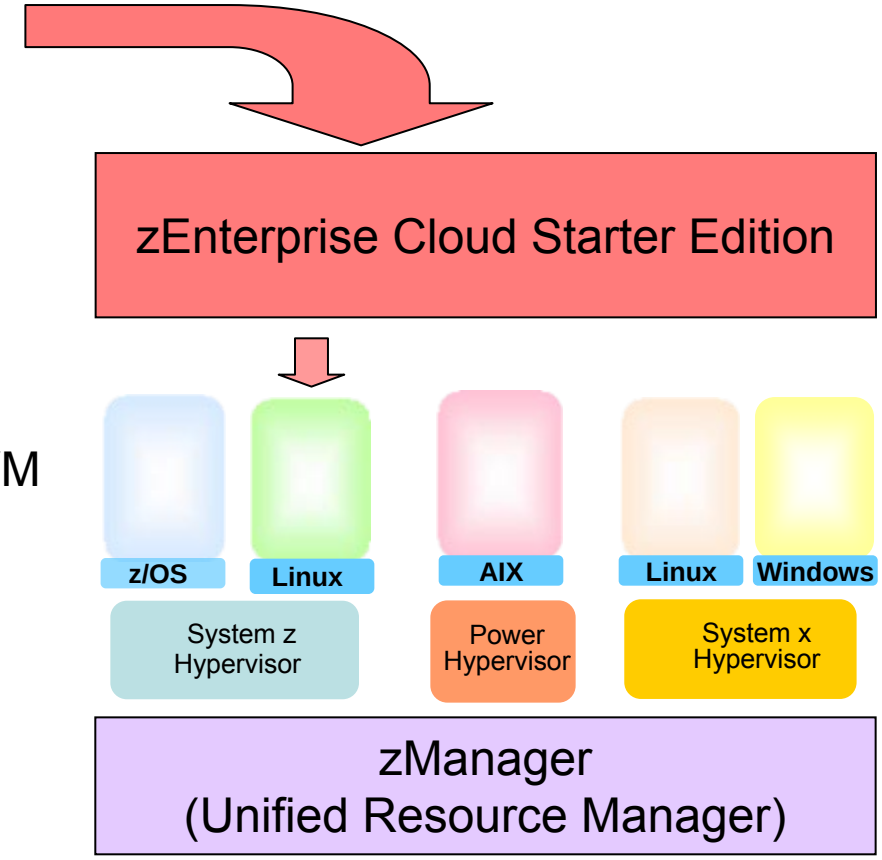
- Enter name for virtual server
- Assign number of virtual processors
- Specify memory
- Add network device
- Add storage device
- Specify boot option
- Select workload



zEnterprise Cloud Starter Edition

Adds package of software and services for automated provisioning and monitoring

- IBM Tivoli software (runs on Linux on System z)
  - Automated provisioning
    - Tivoli Provisioning Manager (TPM)
  - Monitoring
    - Tivoli OMEGAMON XE on z/VM and Linux
- IBM Lab Services
  - Planning, installation, configuring, testing services



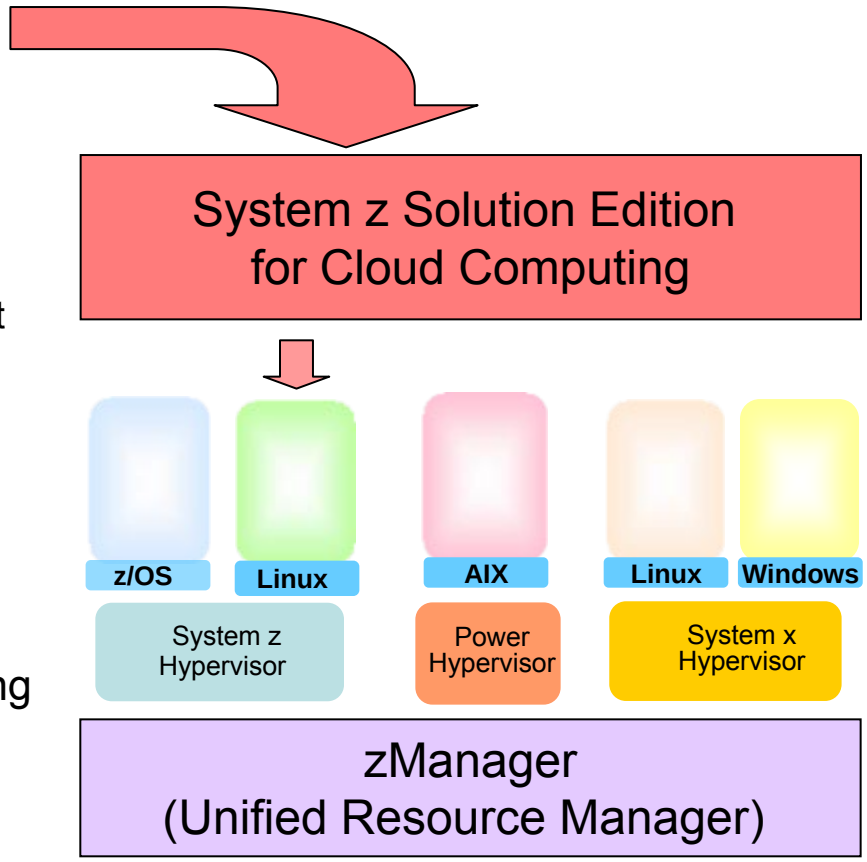
Automated Provisioning With Tivoli Provisioning Manager (TPM)

- 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

IBM System z Solution Edition For Cloud Computing

Adds package of software and services for self-service provisioning, metering, billing and monitoring

- IBM Tivoli software (runs on Linux on System z)
  - Self-service provisioning
    - Tivoli Service Automation Manager (TSAM)
    - TSAM integrates with IBM Workload Deployer appliance to automate provisioning of WebSphere environment
  - Metering and billing
    - 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

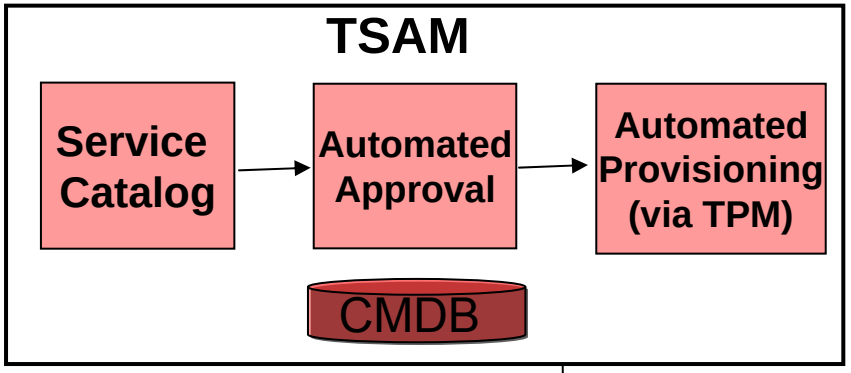


Self-Service Provisioning With Tivoli Service Automation Manager (TSAM)

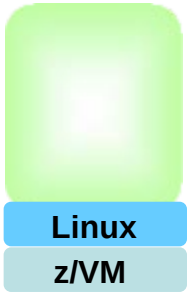
User browses service catalog

Adds service to shopping cart

Submits request



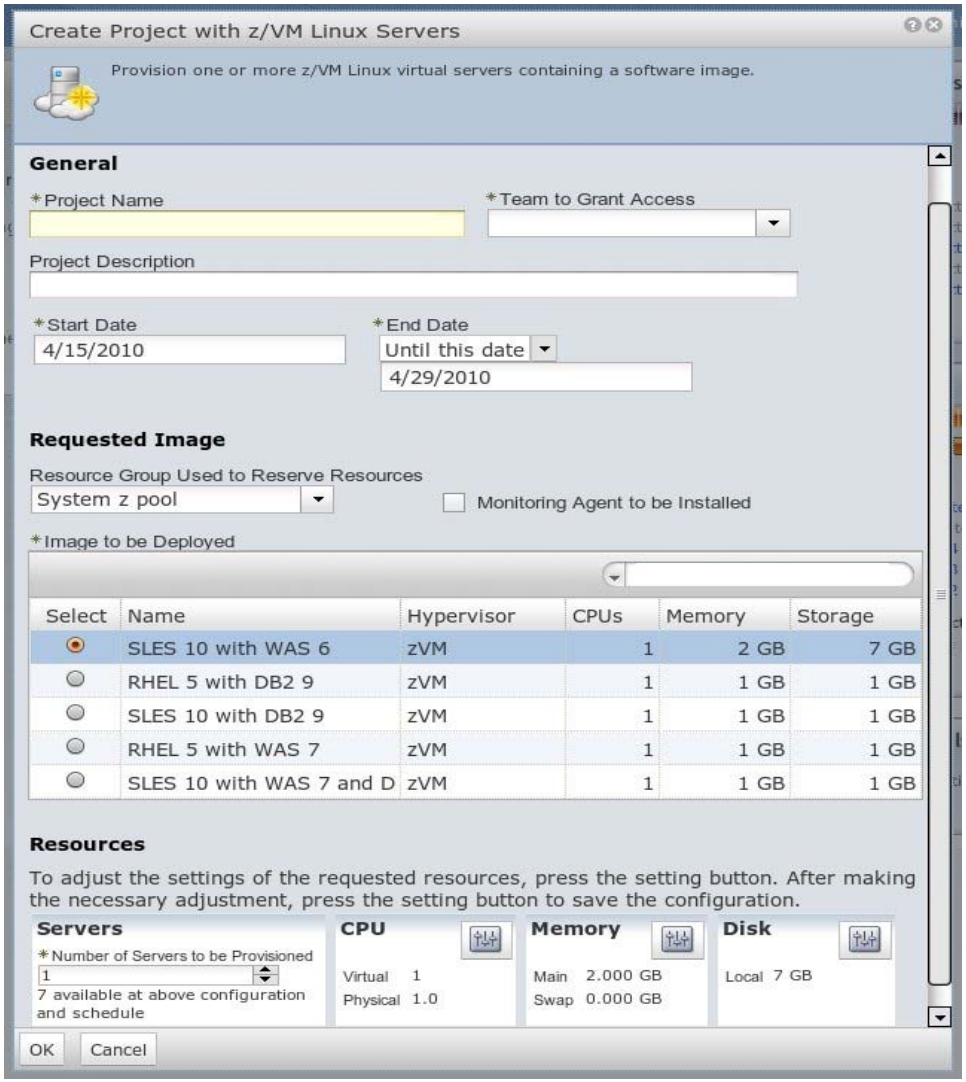
TSAM starts the deployment process via **IBM Tivoli Provisioning Manager** (TPM) workflow



- 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

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



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

Linux

AIX

Win

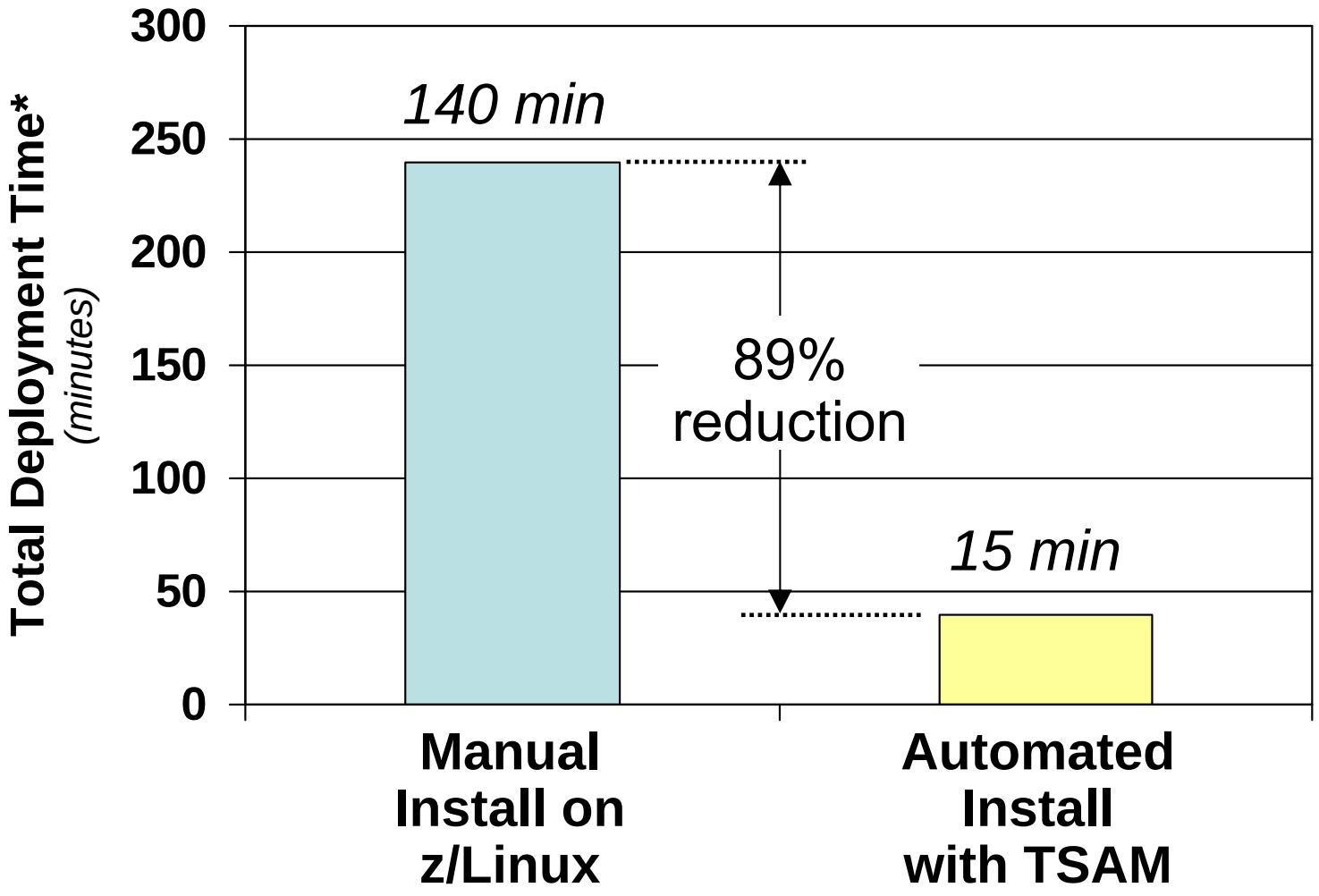
Linux

System z Hypervisor

Power Hypervisor

System x Hypervisor

TSAM Automated Provisioning Is Fast



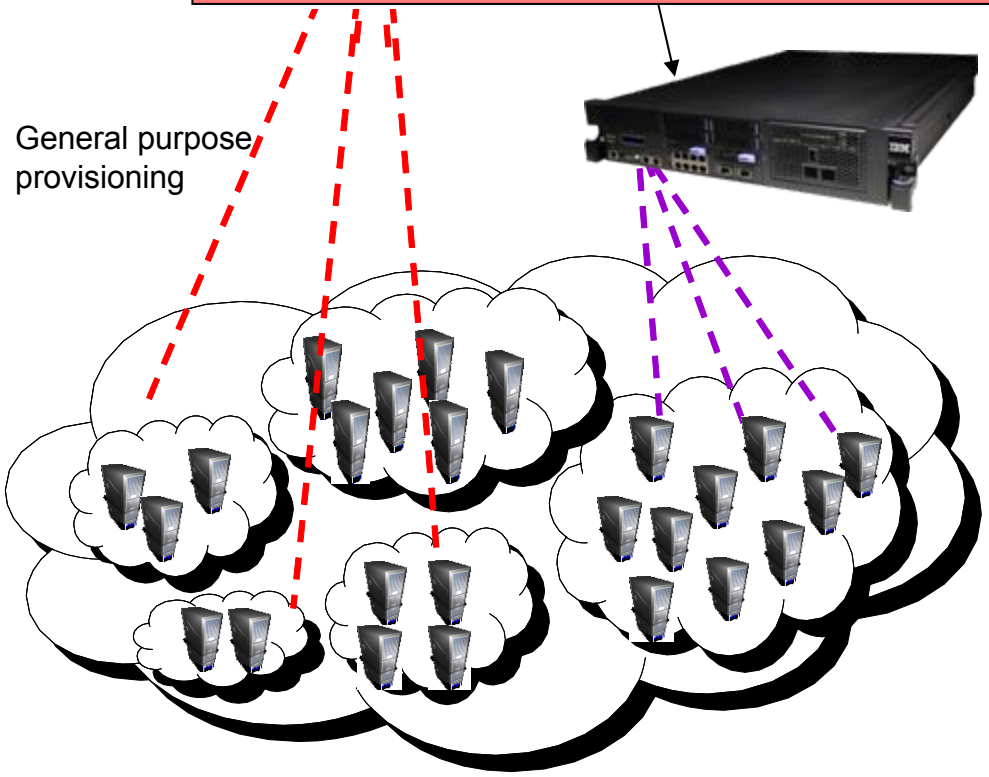
* Excluding network transmission time

Tivoli Service Automation Manager Integrates With IBM Workload Deployer

Request for services

Tivoli Service Automation Manager (TSAM)

General purpose provisioning



IBM Workload Deployer*

- Appliance pre-loaded with standardized WebSphere Application Server Hypervisor Edition and patterns
- Self-service automated provisioning of WebSphere environment onto z/VM on z196

*Can be used for deploying under z/VM on z196

Example Of How It Works - Use Standardized Image For Automated Deployment

Ready

Select and Deploy Pattern

IBM Workload Deployer

Packaged as an OVA

Download OVA

System Ready

Boot Virtual Machine Image

Install Virtual Machine

JEE App

WAS

Linux

z/VM

Execute Script Package to Install JEE Application

Activation engine completes initialization

Extract: JEE Application & Script Package

Extract: Virtual Machine Customization Information

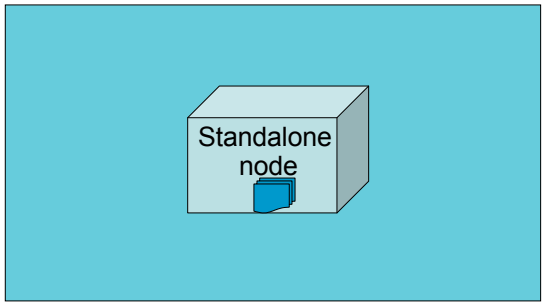
Extract: Virtual Image, Hypervisor Edition Image (OS + WAS)

Private Cloud

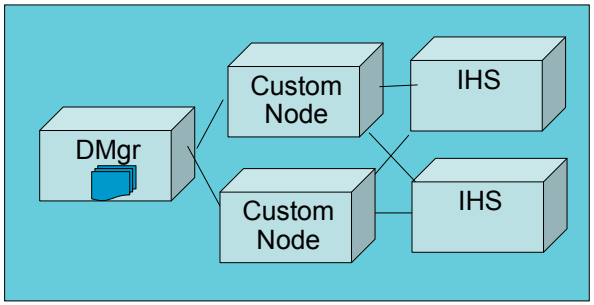
IBM Workload Deployer Deploys Preloaded Virtual System Patterns

A Virtual System Pattern is one or more virtual images and script packages to satisfy a certain deployment topology

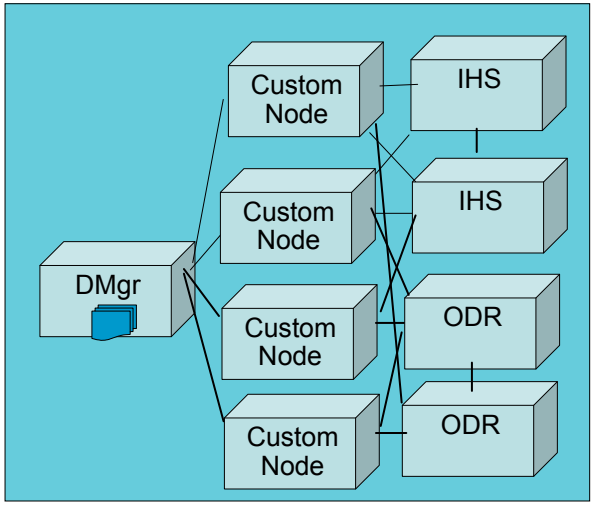
Single Server



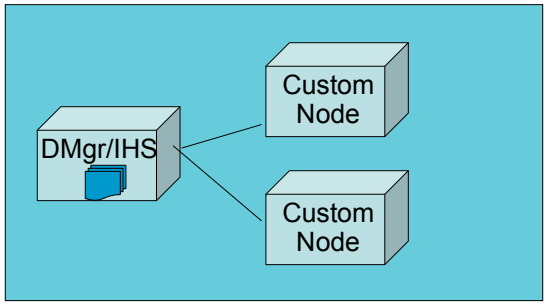
WebSphere cluster



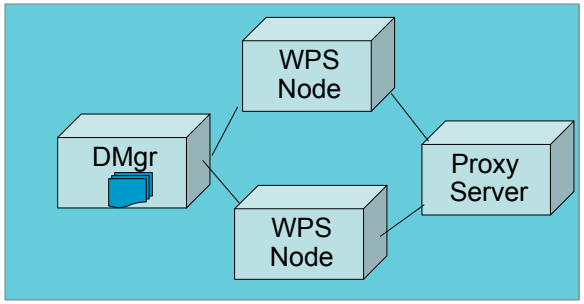
WebSphere Advanced Cluster



WebSphere cluster (dev)



WebSphere Process Server (Scalable)

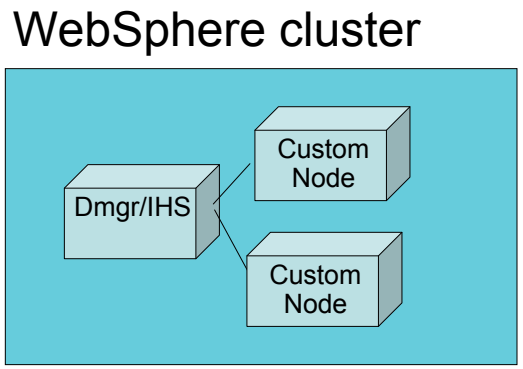


Advanced Options for messaging, session persistence, and global security available

DMgr = Deployment Manager

IHS = IBM http Server

Manual Deployment Steps For WAS Clustered Environment



1. Create 3 virtual servers and install software
   - 1 WebSphere deployment manager/IBM HTTP Server
   - 2 WebSphere Nodes
2. Use the WAS Update Installer to install the required iFixs
3. Configure the HTTP Server
4. Create WebSphere Cluster with 2 members
5. Configure Session replication on servers to support Failover
6. Deploy the Application to the WebSphere Cluster

All of these steps are done automatically with IBM Workload Deployer

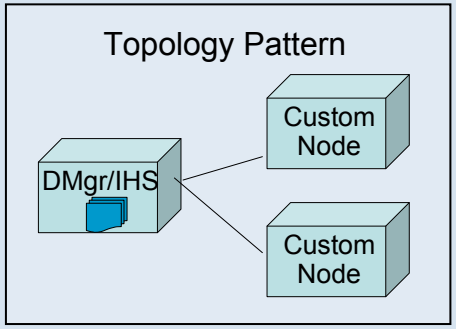
Console Steps To Deploy WAS Cluster Pattern

1 Set up cloud
- Define the systems
- Set up IP groups and networking

2 Select and customize virtual images

Virtual Image
- Profiles
- WebSphere Application Server
- IBM HTTP Server
- Operating System
- Additional Custom Software

3 Select and customize pattern

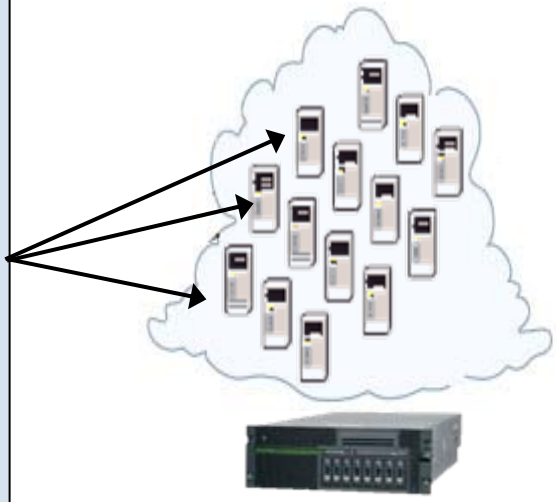


4 Add custom scripts

Script Packages

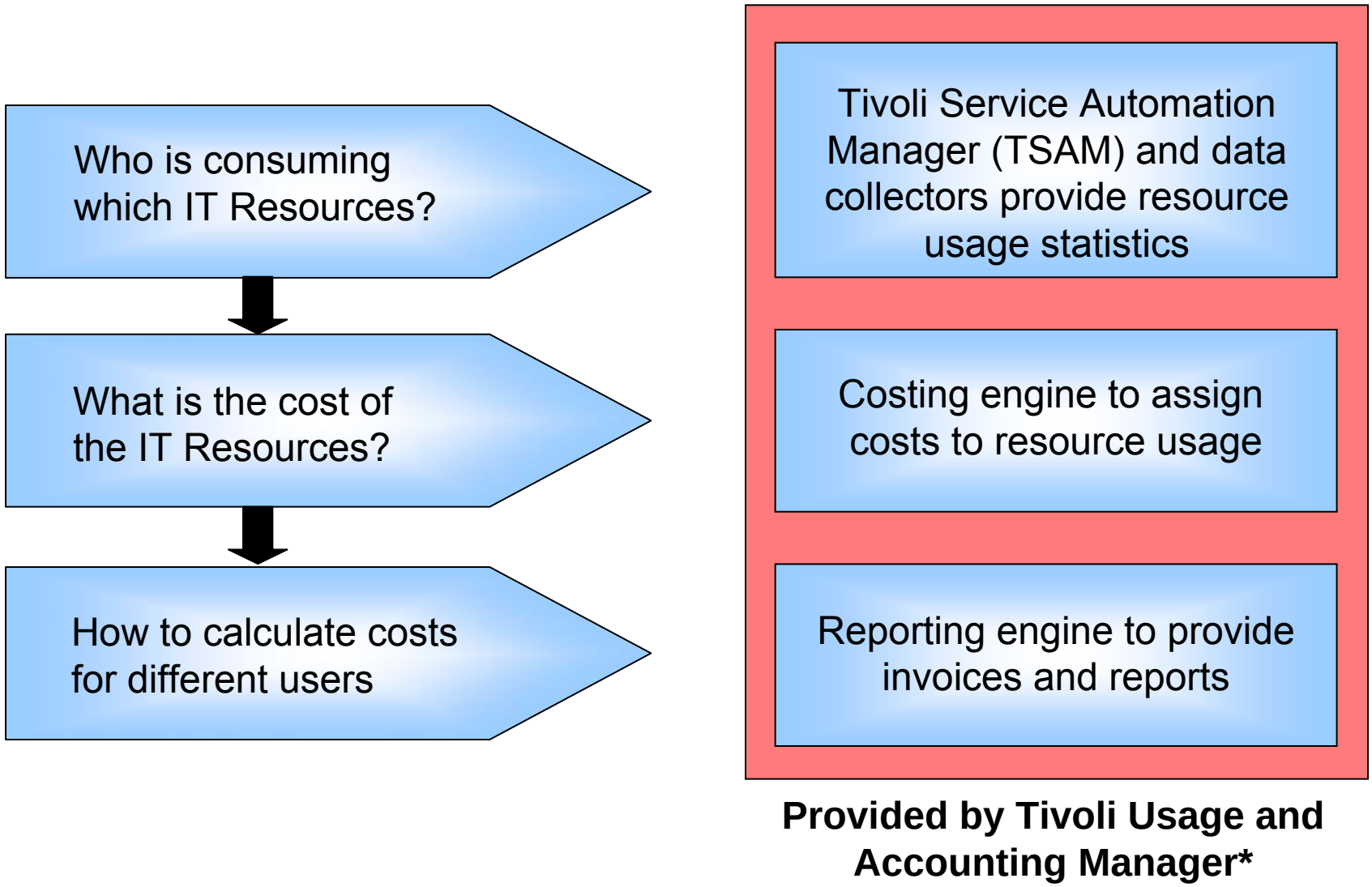
Scripts
- Customize Security
- Define Connections
- Install Application

5 Deploy to the cloud



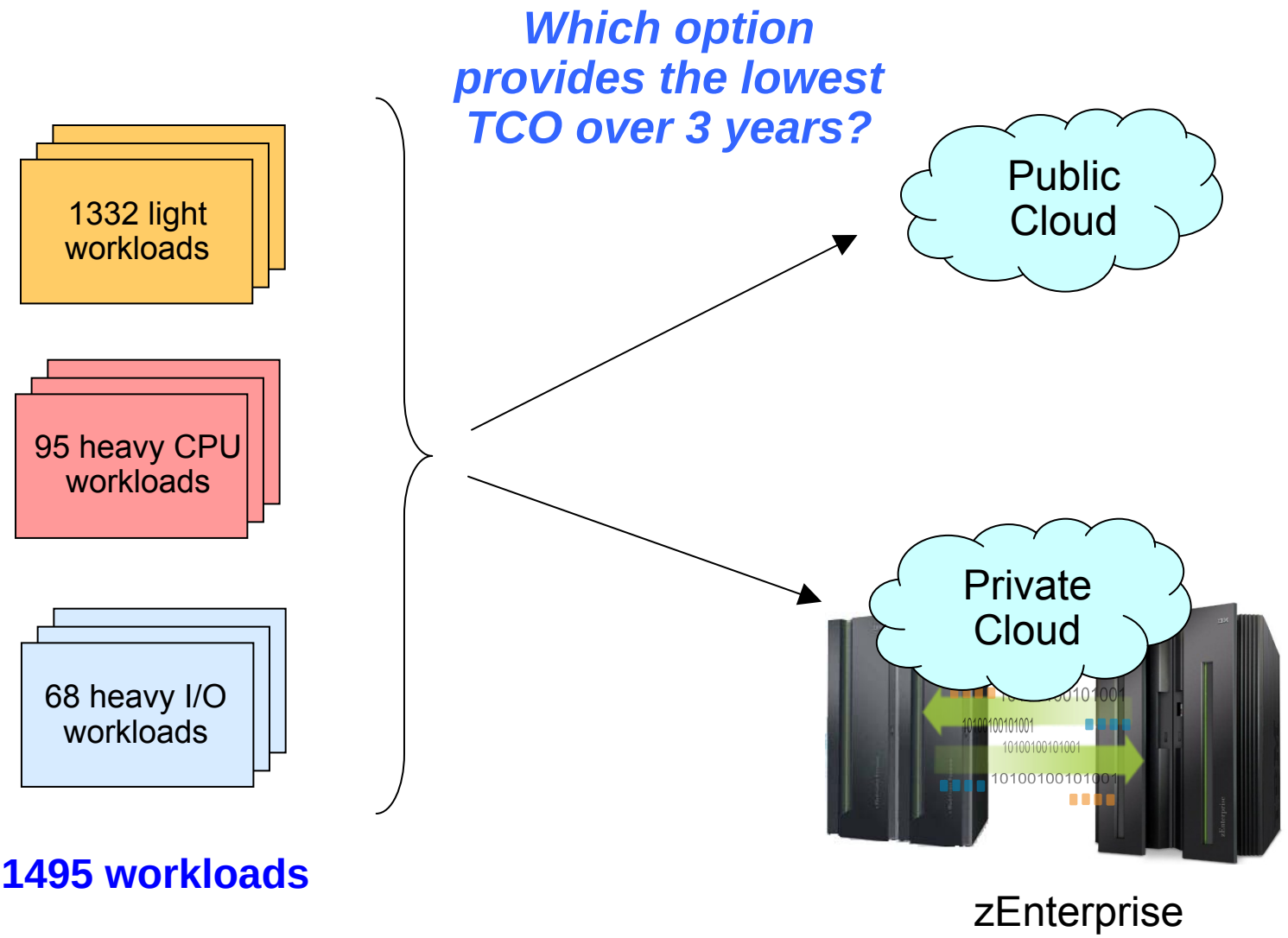
- Focus on the topology – client selects the topology pattern
- Application and configuration scripts are added to the pattern

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

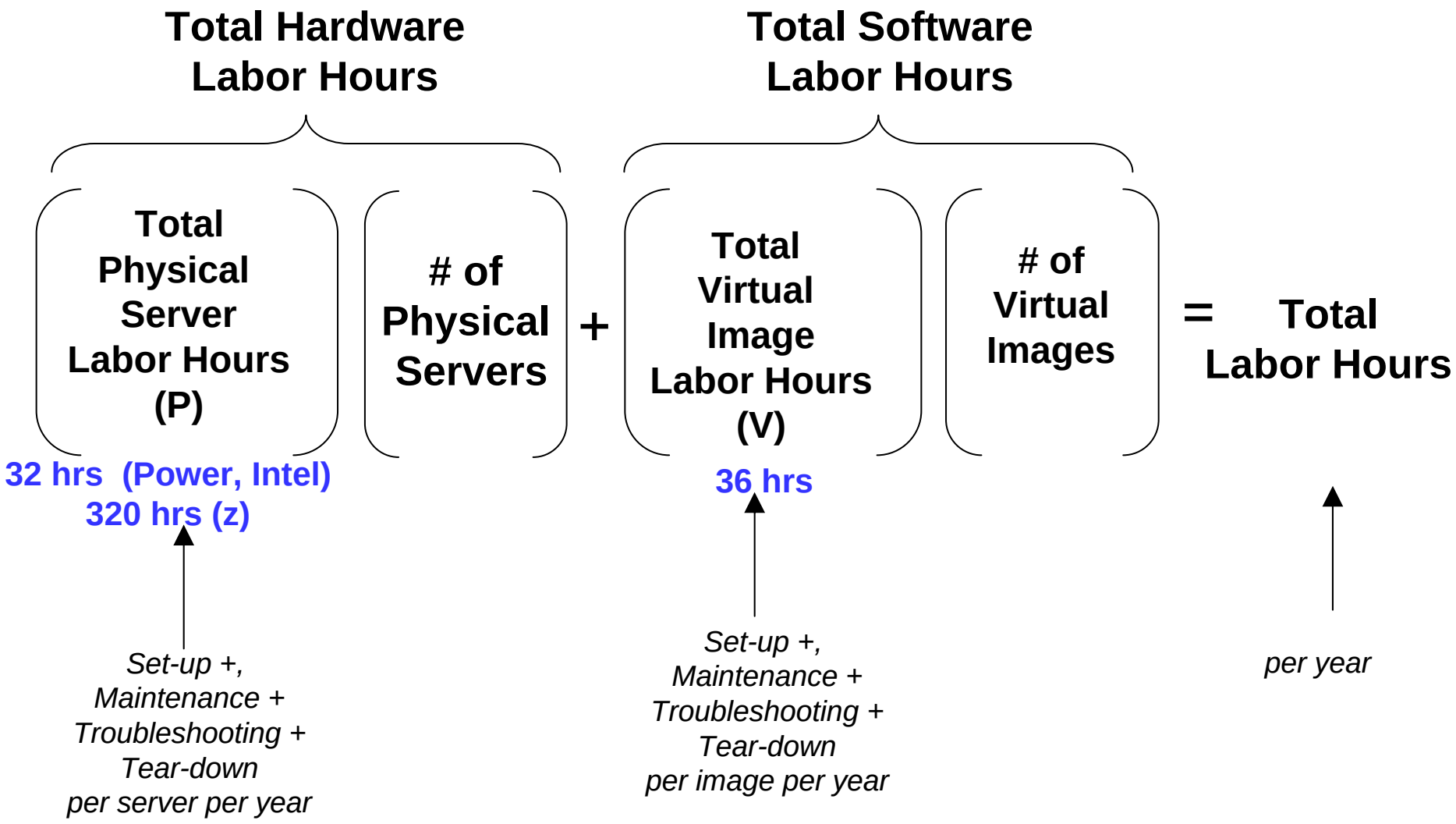


Provided by Tivoli Usage and Accounting Manager*

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



A High-Level View of the Labor Model – Best Fit to Field Data

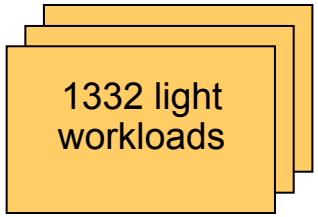


Values best fit to collected field data

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

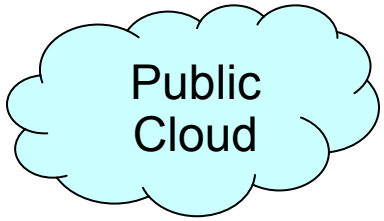
- Consolidation ratios based on benchmark data assume “always on” operation
- On average, not all workloads are active all the time
- Amazon EC2 public cloud recognizes this by running with an “oversold” factor of 1.7
  - Assumes each server can support 1.7 times the indicated capacity of virtual machines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

Deploying Light Workloads

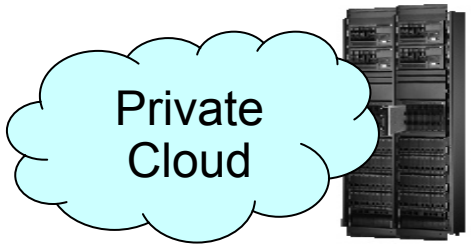


- **IBM WebSphere ND**
- **Monitoring software (ITCAM)**

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



1332
Large
compute instances



28
IBM POWER7
blades in 1 zBX

* CPO on-line banking benchmark

Deploying Heavy CPU Workloads With Light I/O

95 heavy CPU workloads

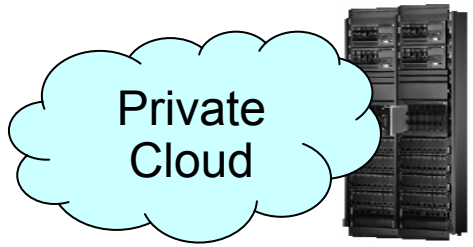
- **IBM WebSphere ND**
- **Monitoring software (ITCAM)**

Online banking workloads*, each driving **460** transactions per second with light I/O

Public Cloud

95
Cluster Compute Quadruple Extra Large compute instances

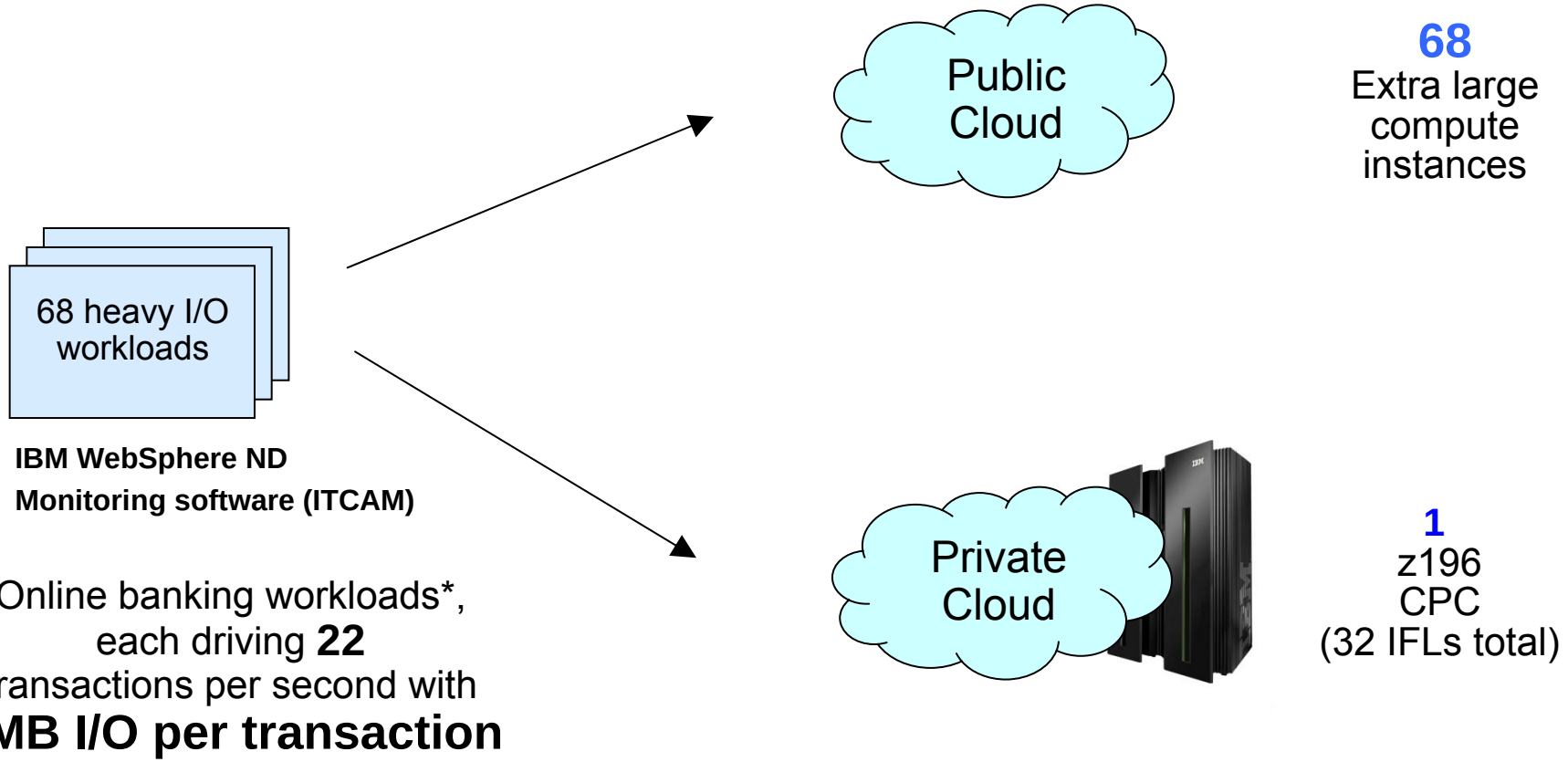
Private Cloud



28
IBM HX5 blades in 1 zBX

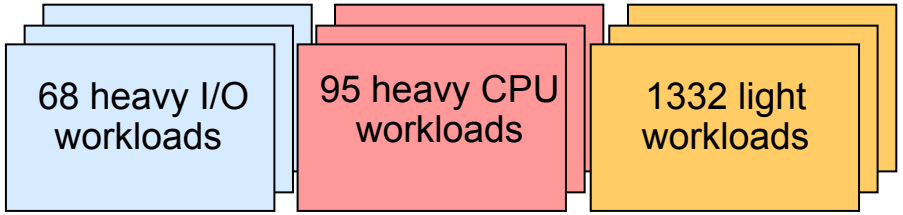
* CPO on-line banking benchmark

Deploying Light Workloads With Heavy I/O



* CPO on-line banking benchmark

Compare Cost Of Acquisition For 3 Years



Deployed on public cloud

Public Cloud

1495 Compute Instances

$77.2M (3yr TCA)

Optimized on zEnterprise

Private Cloud

zEnterprise

32 IFL's, 28 Intel blades, 28 Power blades

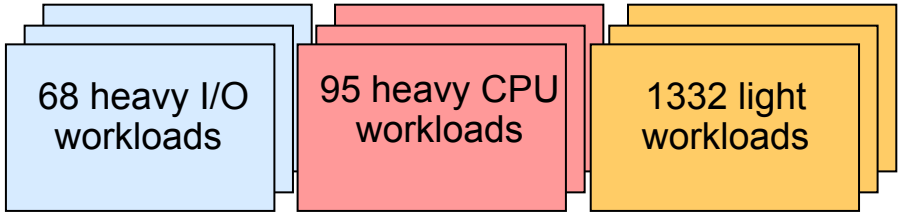
704 cores

$22.6M (3yr TCA)

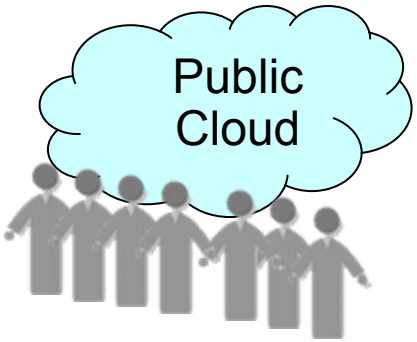
71% less

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



42,086 labor hours/yr

20.23 administrators

$9.7M

3 years @ $159,600/yr

Optimized on zEnterprise

31,146 labor hours/yr

14.97 administrators

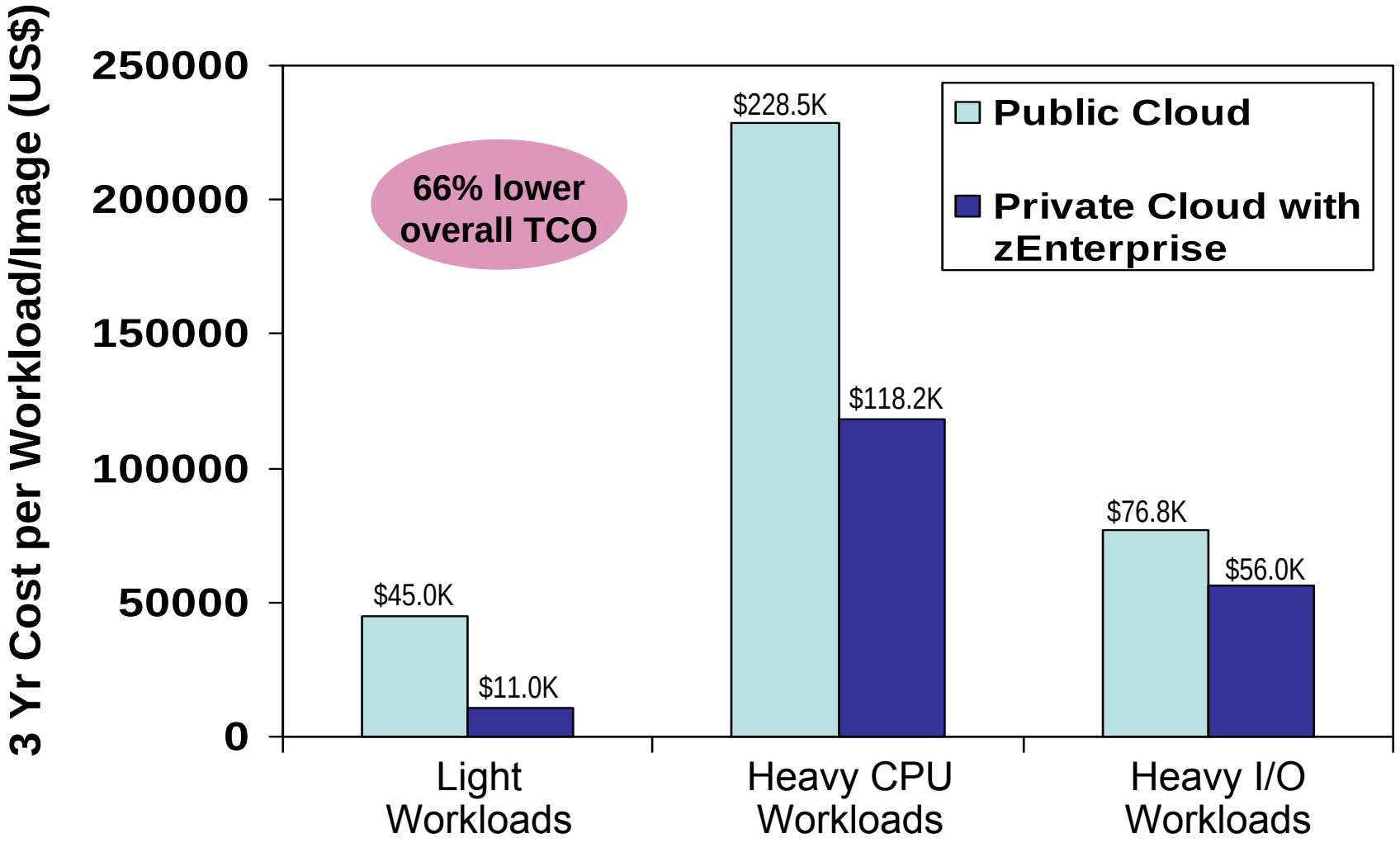
$7.2M

3 years @ $159,600/yr

26% 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