IBM System z Technology Summit

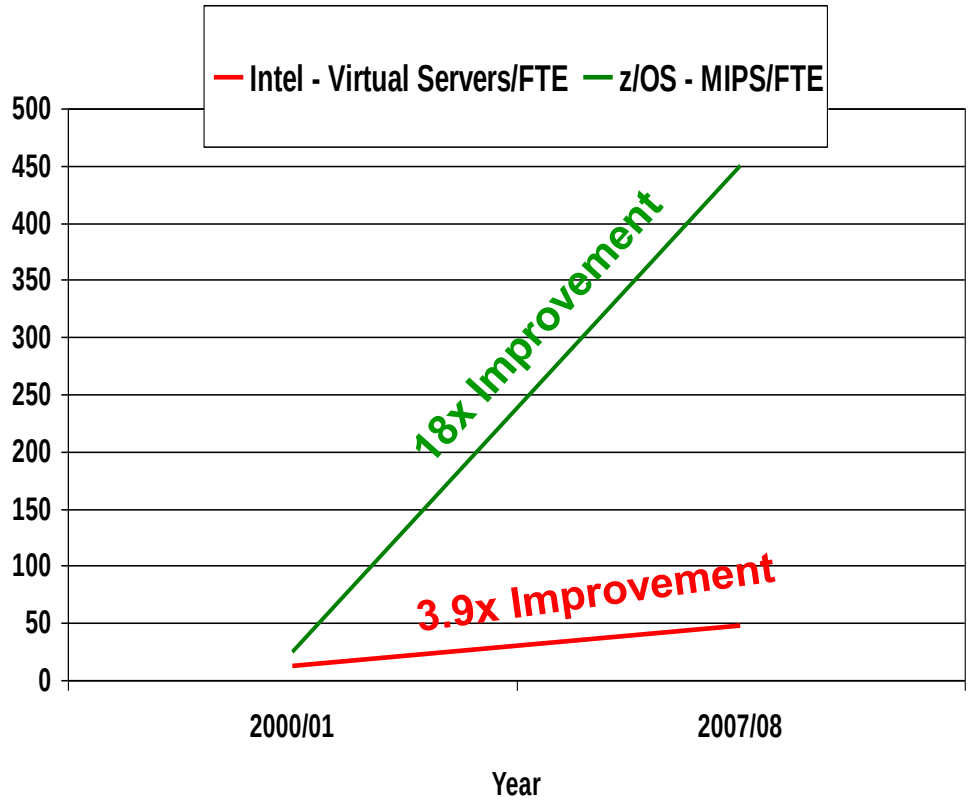
zEnterprise – The First System Of Systems

Reduce Labor Costs With zEnterprise

Roberto Calderon

25th May 2011

Labor Cost Trends Favor a Centralized Structured Approach to Management



Large scale consolidation and consistent structured management practices drive increases in labor productivity

Small scale consolidation with ad hoc management achieves lesser gains

The more workloads you consolidate and manage with consistent structured practices…
the lower the management labor cost

Source: IBM Scorpion Studies

zManager Provides Structured Management for zEnterprise Virtual Environments

Process	Typical Distributed Management Practices	zManager
Asset Management	■ Discover assets with ad hoc methods ■ Manual entitlement management	■ Automated discovery and management of entitlement assets
Deployment Management	■ Manually configure hypervisor and build networks	■ Automated deployment of hypervisor and attachment to dedicated networks
Capacity and Performance Management	■ Manually adjust CPU resources to meet changing workload demands ■ No end-to-end transaction monitoring	■ Automatic CPU resource adjustments to meet changing workload demands ■ End-to-end transaction monitoring to isolate issues
Security Management	■ Different ways to manage administrator access	■ Centralized, fine-grained administrator access management
Change Management	■ No visibility into impact of changes	■ Track dependencies in an ensemble for change impact

zEnterprise And Tivoli Support Structured Management Practices For All Workloads

IBM Integrated Service Management for System z

End-to-End Service Management

Unified Resource Manager (zManager)

Integrated Platform Management

System z Hypervisor

Power Hypervisor

System x Hypervisor

Data Network

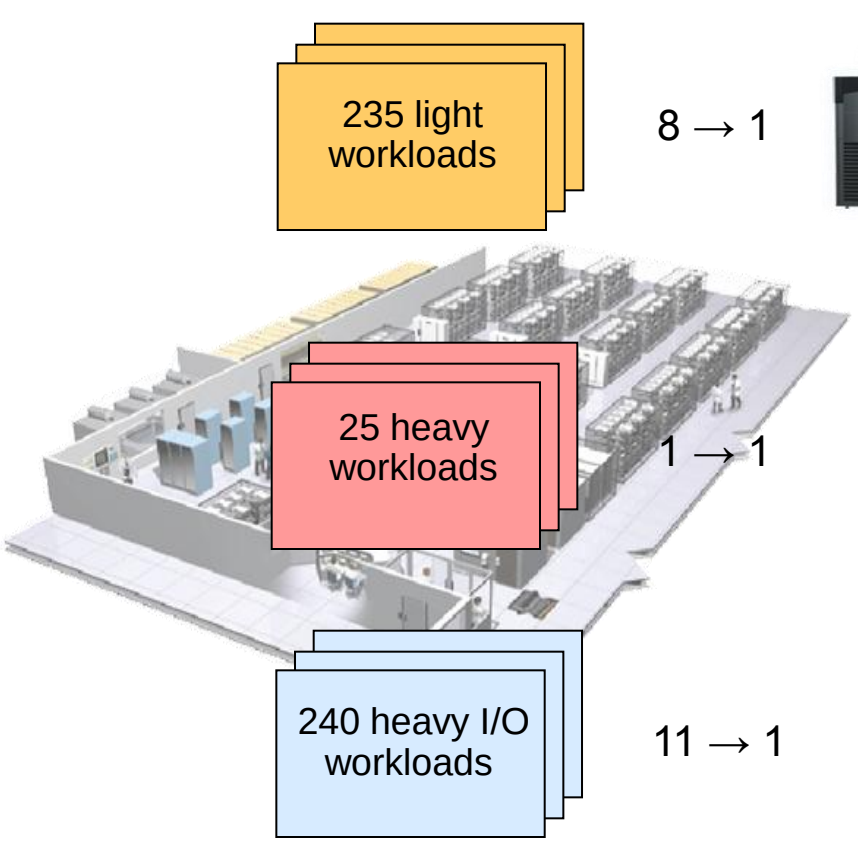
Management Network

Integrated Fit-for-Purpose Platform

zEnterprise

Extends System z quality of service to all environments

What Does It Cost To Deploy 500 Workloads On Virtualized Intel Servers?



Deployed on ***30*** Intel Xeon Servers using VMware
(8 cores each)

Deployed on ***25*** Intel Nehalem Servers
(8 cores each, non-virtualized)

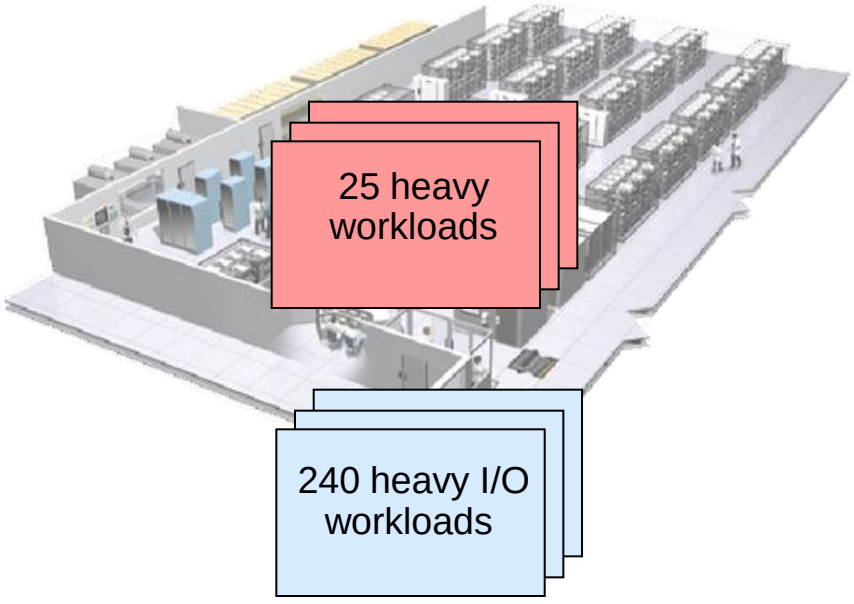
Deployed on ***22*** Intel Nehalem Servers using VMware
(8 cores each)

500 workloads

77 servers

IBM analysis of a customer scenario with 10,000 distributed workloads. Deployment configuration is based on consolidation ratios derived from IBM internal studies.

What Does It Cost To Deploy 500 Workloads On zEnterprise?



36 workloads per x blade

6
IBM x86 blades in 1 zBX

2 workloads per p blade

12
POWER7 Blades in same zBX

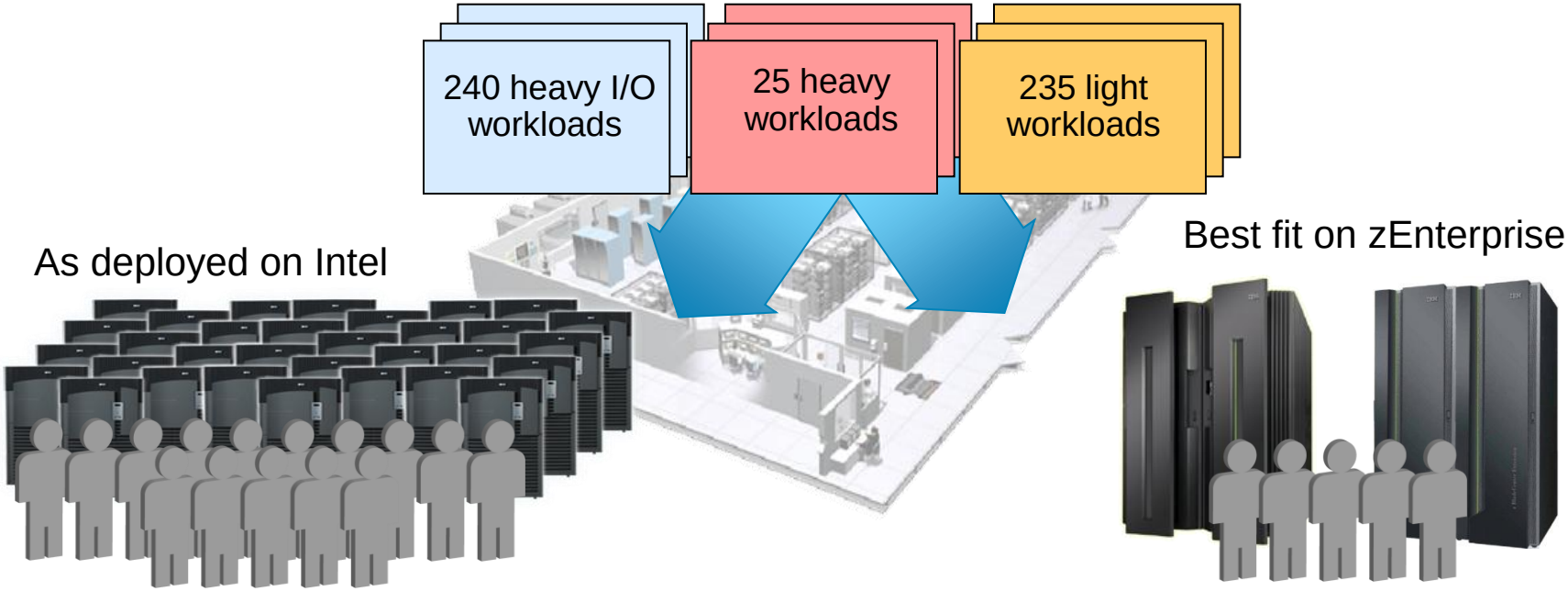
240 workloads per 32 IFLs

1
zEnterprise CPCs 32 IFLs

Best fit assignments
Better utilized with zManager

Configuration is based on consolidation ratios derived from IBM internal studies. z196 32-way performance projected from z196 8-way and z10 32-way measurements.
The zBX with x86 blades is a statement of direction only. Results may vary based on customer workload profiles/characteristics.

Compare Server Infrastructure Labor Costs



14,992 labor hours/yr

7.21 administrators

$3.45M

3 years @ $159,600/yr

12,147 labor hours/yr

5.84 administrators

$2.80M

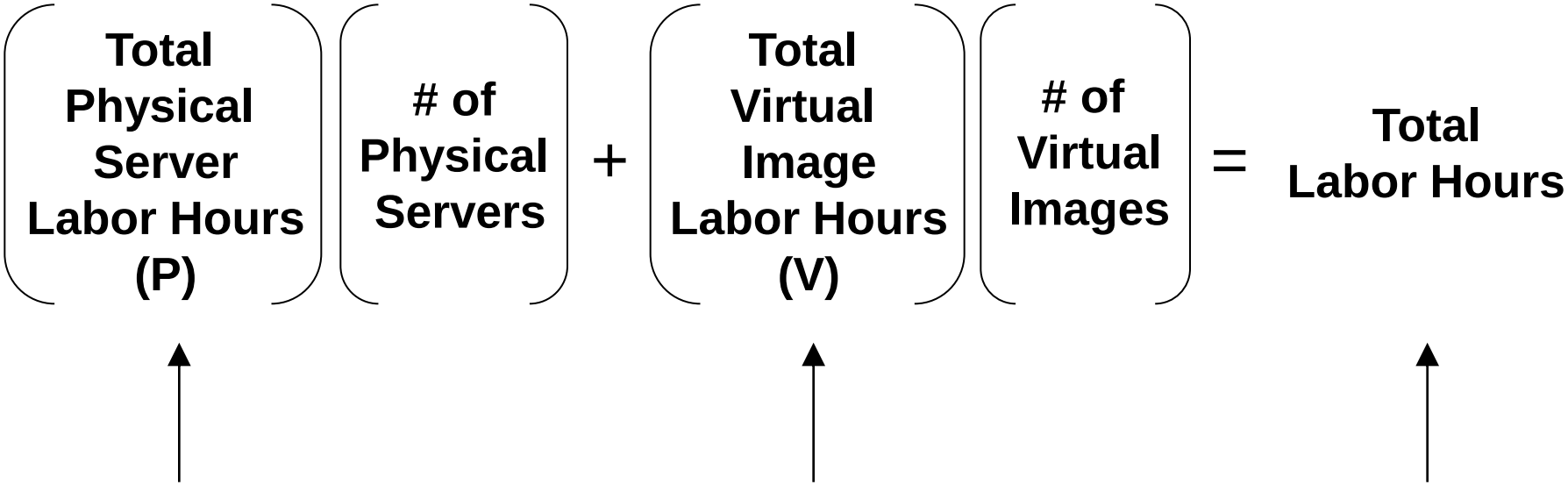
3 years @ $159,600/yr

19%

less

Configuration based on IBM internal studies. Labor model based on customer provided data from IBM studies
Labor rates will vary by country

A High-Level View Of The Labor Model



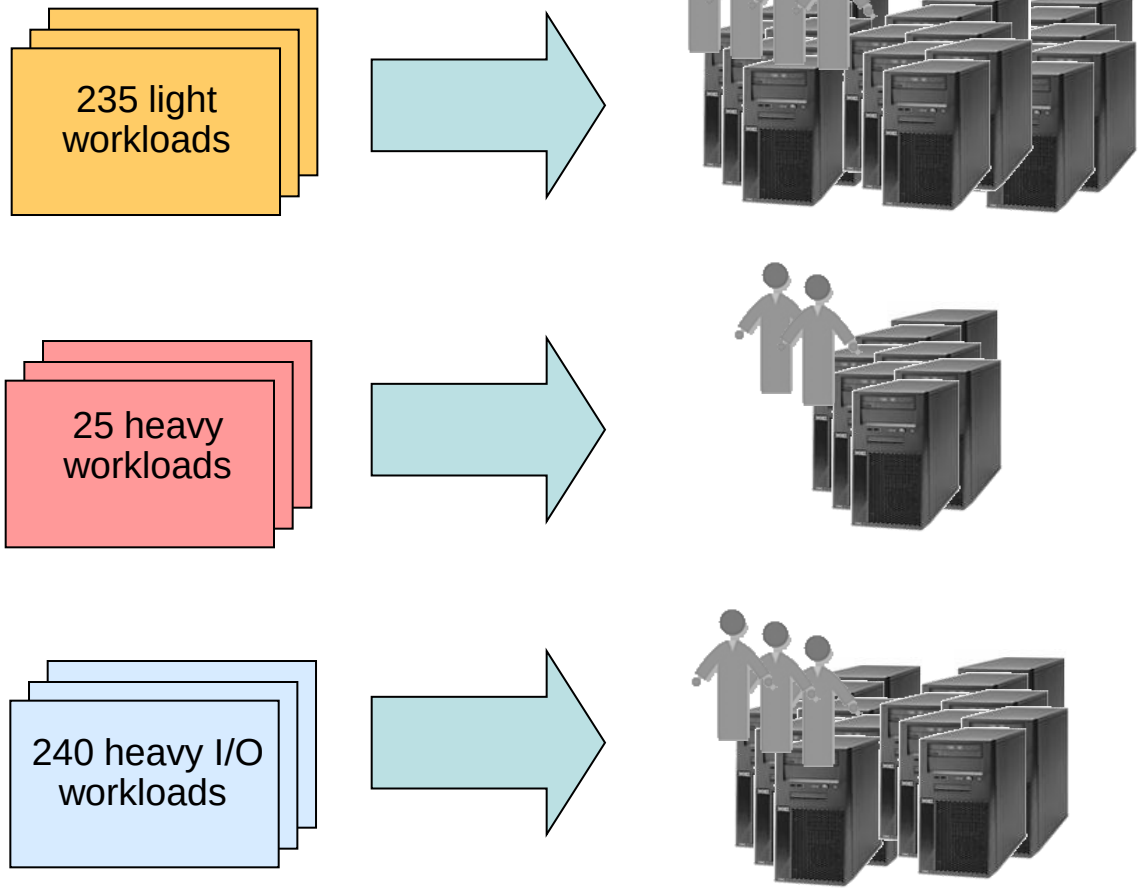
Accumulated Field Data For Labor Costs

- Average of quoted infrastructure labor costs
  - **30.7** servers per FTE (dedicated Intel servers)
    - **67.8** hours per year per server for hardware and software tasks
  - **52.5** Virtual Machines per FTE (virtualized Intel servers)
    - **39.6** hours per year per Virtual Machine for software tasks and amortized hardware tasks
    - Typical 8 Virtual Machines per physical server

- Best fit data indicates
  - Hardware tasks are **32** hours per physical server per year
    - Assume this applies to Intel or Power servers
    - Internal IBM studies estimate 320 hours per CPF for zLinux scenarios
  - Software tasks are **36** hours per software image per year
    - Assume this applies to all distributed and zLinux software images

Labor model based on customer data from IBM studies

Distributed Infrastructure - Labor Costs are Significant



6,848 labor hours
(3.29 administrators, or $525,465 per year)

1,426 labor hours
(0.69 administrators, or $109,449 per year)

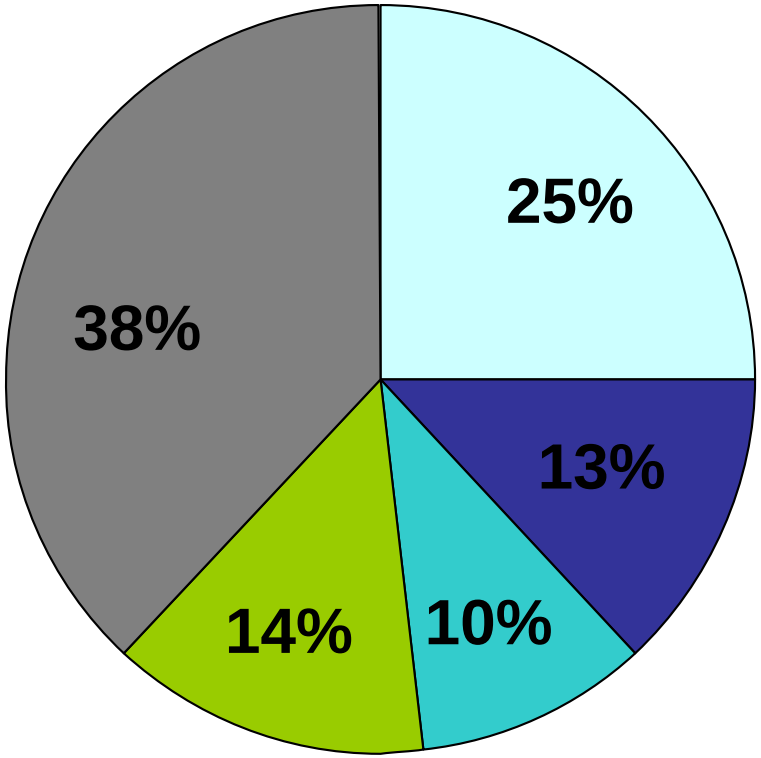
6,717 labor hours
(3.23 administrators, or $515,434 per year)

14,992 total labor hours, 7.21 administrators, or $1.15M per year cost

Based on fully-burdened rate of $159,600 per year for each FTE (2,080 hrs/yr)

Configuration based on IBM internal studies. Labor model based on customer provided data from IBM studies. Labor rates will vary by country

Five Key IT Processes for Infrastructure Administration

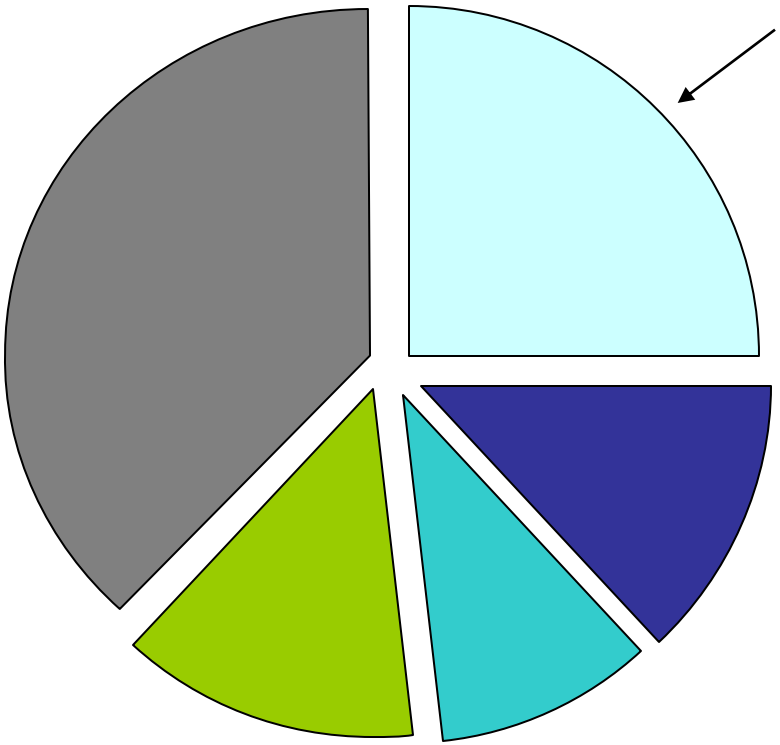


- **Asset Management**
  - *– Hardware and software asset tracking*
- **Deployment Management**
  - *– Hardware set-up and software deployment*
- **Capacity/Performance Management**
  - *– Monitor and respond automatically*
- **Security Management**
  - *– Access control*
- **Change Management**
  -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

Fractional allocation of labor based on an in depth Eagle TCO study with a typical large financial services customer

Allocation based on customer data from IBM study

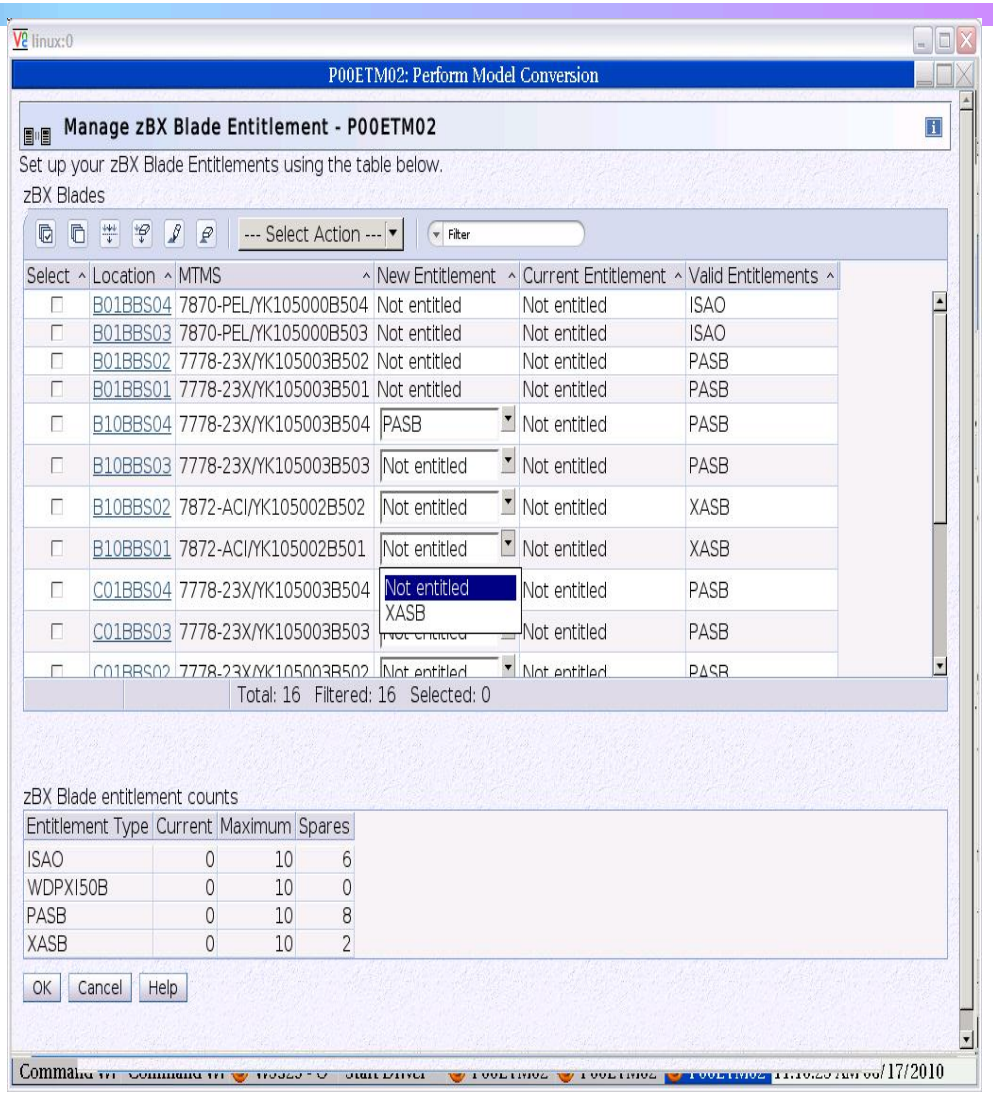
Example - Cost Reduction Strategies



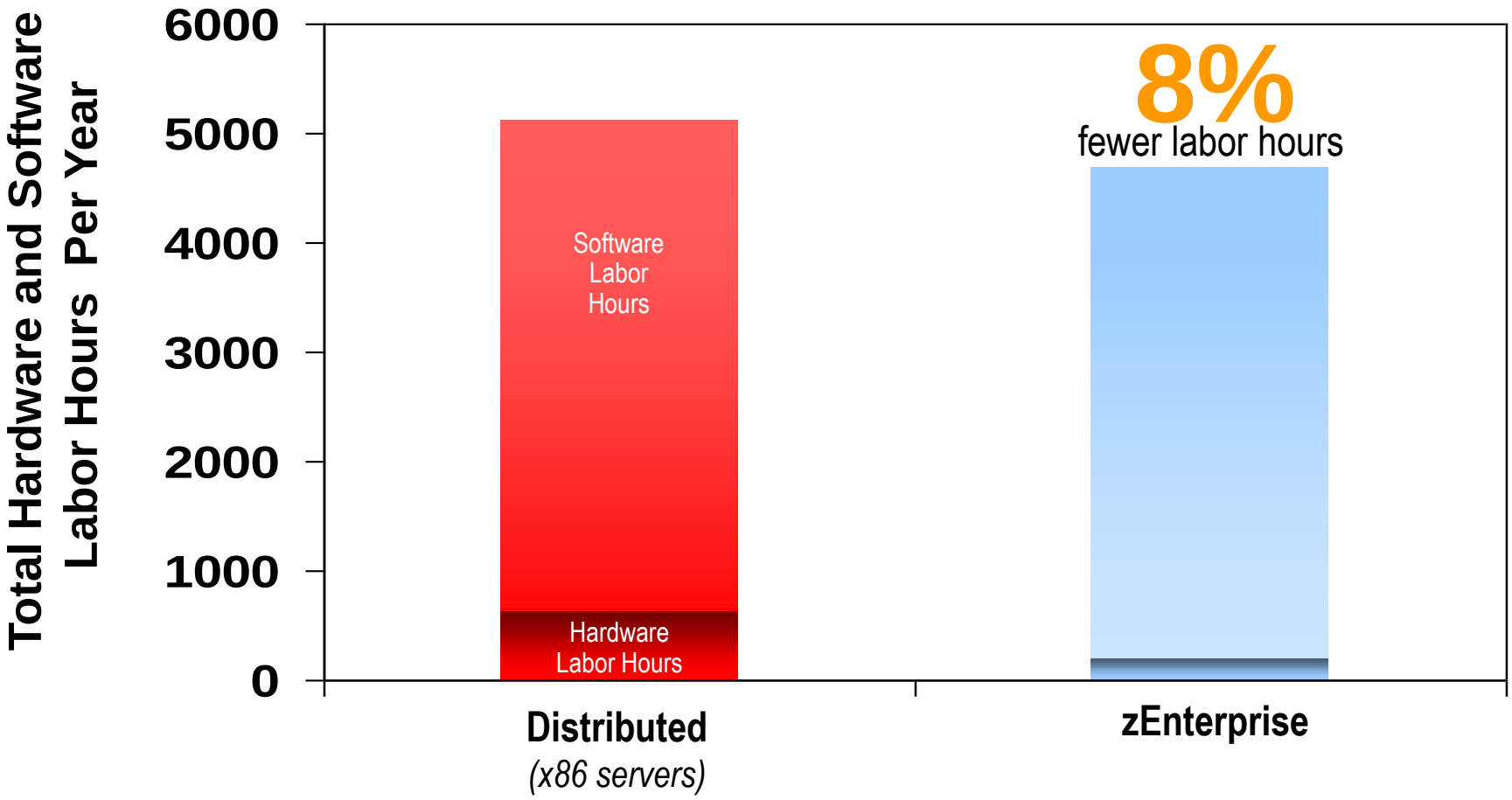
- **Reduce Asset management costs**
  - **Automatic** discovery and management of resource entitlements

Auto-Discovery and Entitlement Management with zManager

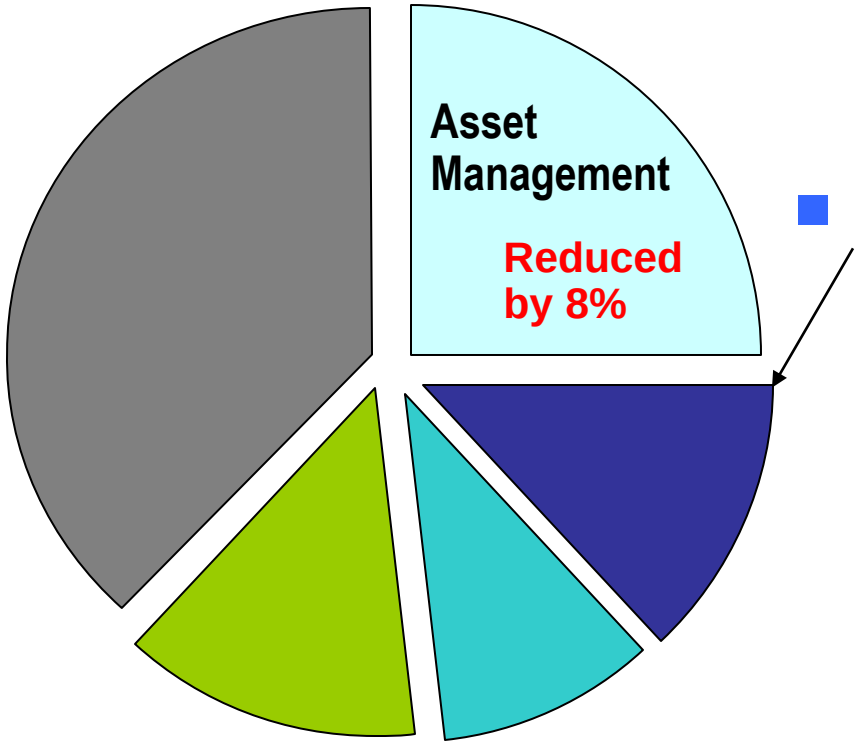
- Auto-discover and inventory for all elements
  - No need to install and configure libraries or sensors
  - No need for user scheduling
- Customer can manage discovered hardware from zManager panels
  - Power on and manage entitled resources



Productivity Improvements Through Automation Drive Down Asset Management Labor Costs



Example – zEnterprise Labor Cost Reduction Strategies



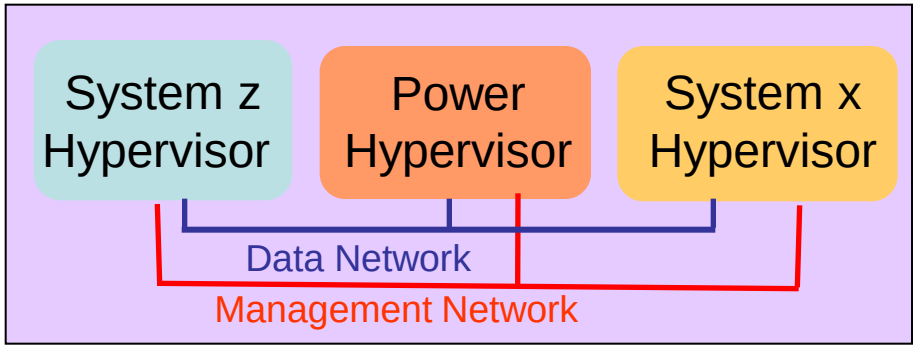
- **Reduce Deployment Costs**
  - **Automation** with zManager improves productivity
    - Automatic setup and configuration of the hypervisor with zManager
    - Two internal networks all physically setup out-of-the-box in zBX and managed by zManager
      - Pre-configured private and physically isolated internal management network
      - Private and secure data network

Based on IBM internal study.
Labor model based on customer provided data from IBM studies

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

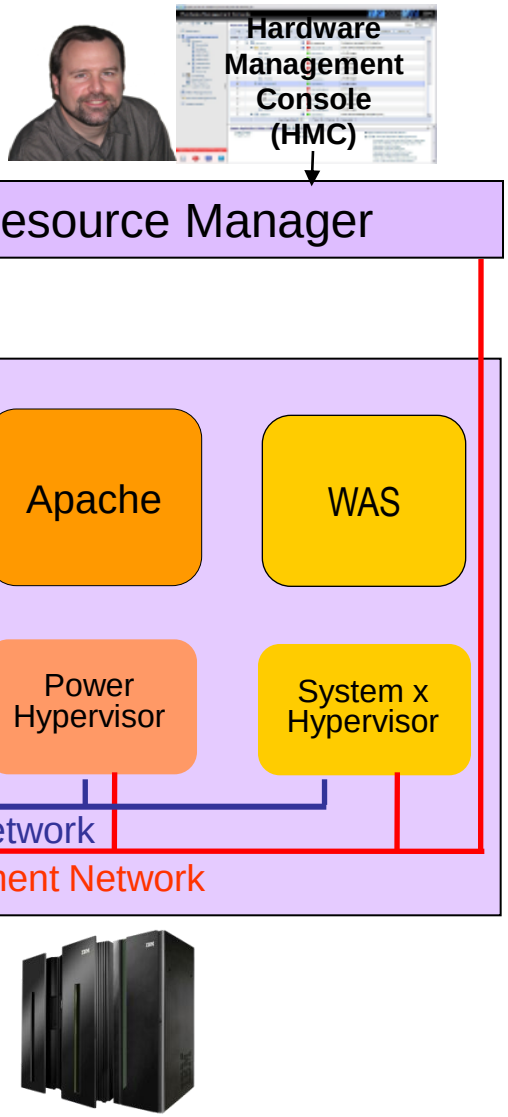
Centralized and Secure Virtualization Platform



zEnterprise

Centrally Manage Hypervisors and Virtual Servers with zManager

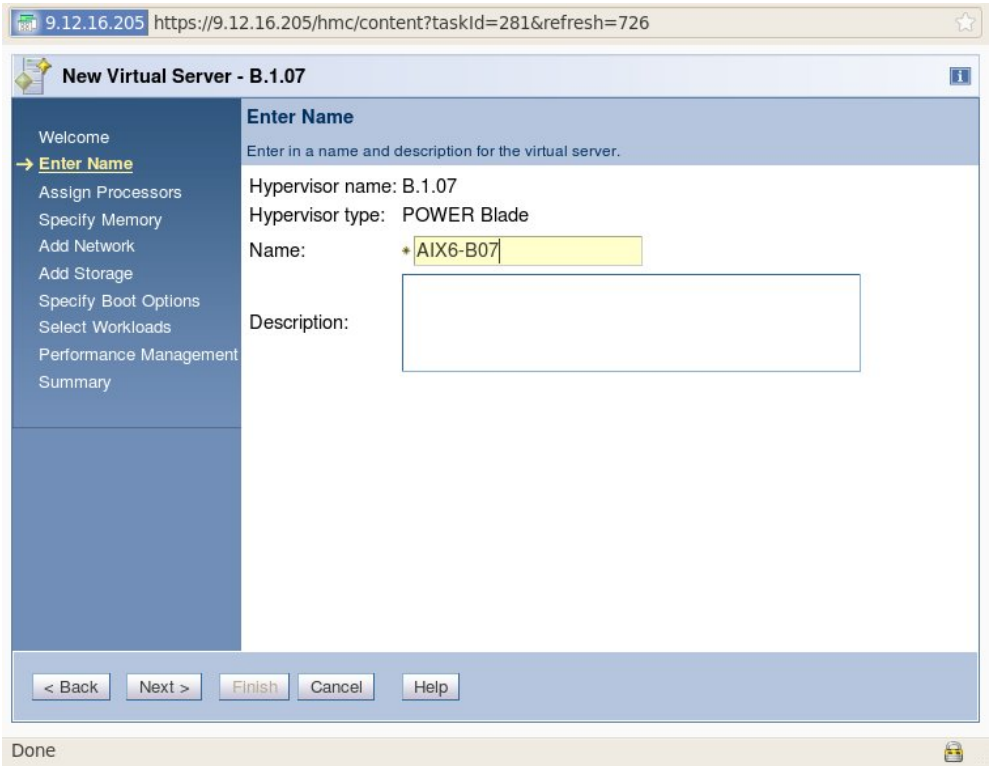
- Start, stop, and query/list hypervisors
- Create virtual networks
- Create virtual machines across all hypervisors from one console
- Start / stop/ delete virtual servers
- Monitor resource usage
  - CPU, Memory, Power consumption



DEMO: Blade Entitlement and Virtual Server Management with zManager

- Entitle a blade (hypervisor automatically set up and configured)

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



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

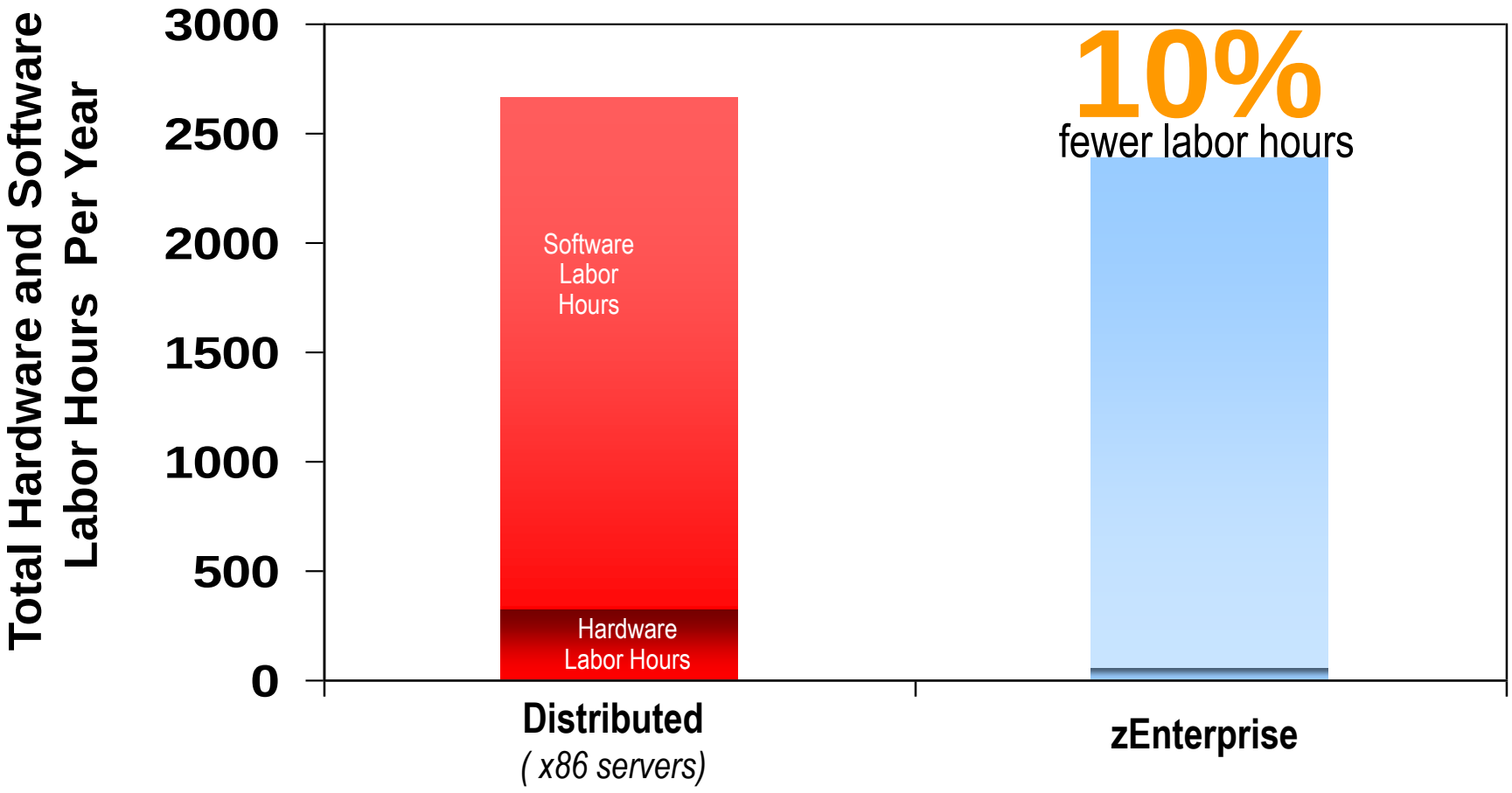
Do-It-Yourself Tasks (for two BladeCenters)	Elapsed/Labor Time
Planning (includes time to go over docs, etc)	5 hrs
Cabling	2 hrs
AMM Configuration	2 hrs
Logical Configuration (L2)	8 hrs
Blades network configuration	4 hrs
Testing	2 hrs
Documenting the configuration	3 hrs
TOTAL TIME	**26 hrs**

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**

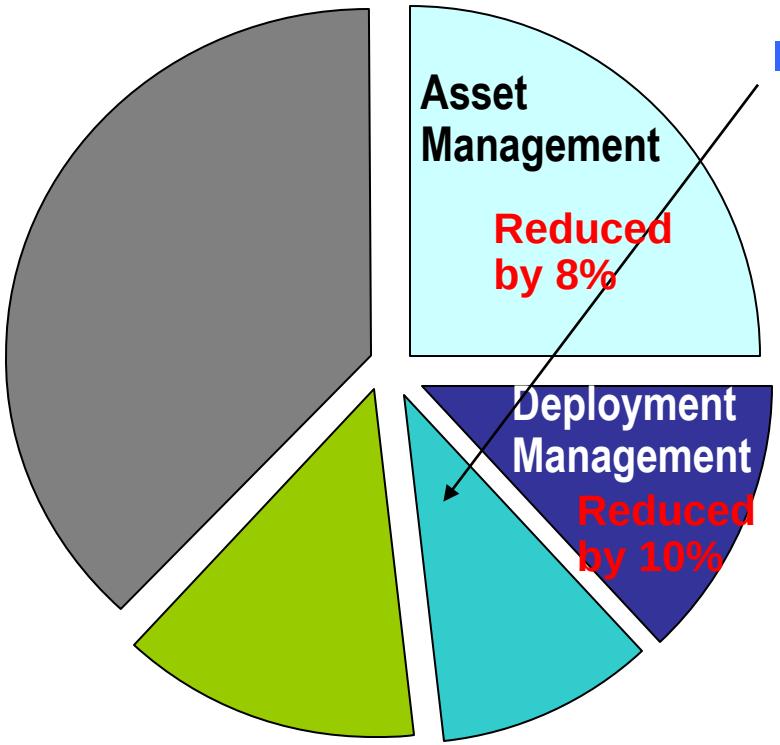
81% reduction in labor time

Source: IBM CPO Internal Study

Automation on zEnterprise Provides Deployment Labor Savings



Example - Cost Reduction Strategies



- **Reduce capacity/performance management costs**
  - **Automation** with zManager to isolate and fix issues improves productivity
    - Cross-platform Hardware Problem Detection, Reporting and Call Home
    - Automatic resource adjustments for workloads to meet performance goals
    - End-to-end transaction monitoring to isolate and fix issues with workloads running on multiple heterogeneous virtual servers

Based on IBM internal study.
Labor model based on customer provided data from IBM studies

Cross-platform Hardware Problem Detection, Reporting and Call Home

- FFDC (first failure data capture) data collected for hardware issues
- Gather logs, problem analysis, open problem ticket and call home reporting
- Guided repair and verification for a hardware service action

Less time spent on fixing hardware issues

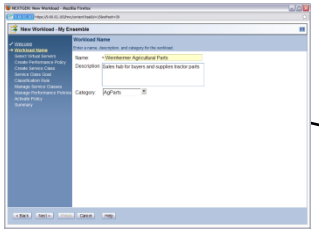
Capacity/Performance Management of Workload with zManager

- Workload is a grouping of the virtual servers supporting a business application and the Workload provides a “management view” of these virtual servers
- Provides a set of user interface functions related to Workload
  - Define a Workload
  - Associate virtual servers with a Workload
  - Define performance goals for a Workload
- zManager can dynamic adjustment of virtual processor entitlements across virtual servers on a particular hypervisor to achieve their performance goals
- Track transaction performance end-to-end and isolate bottlenecks

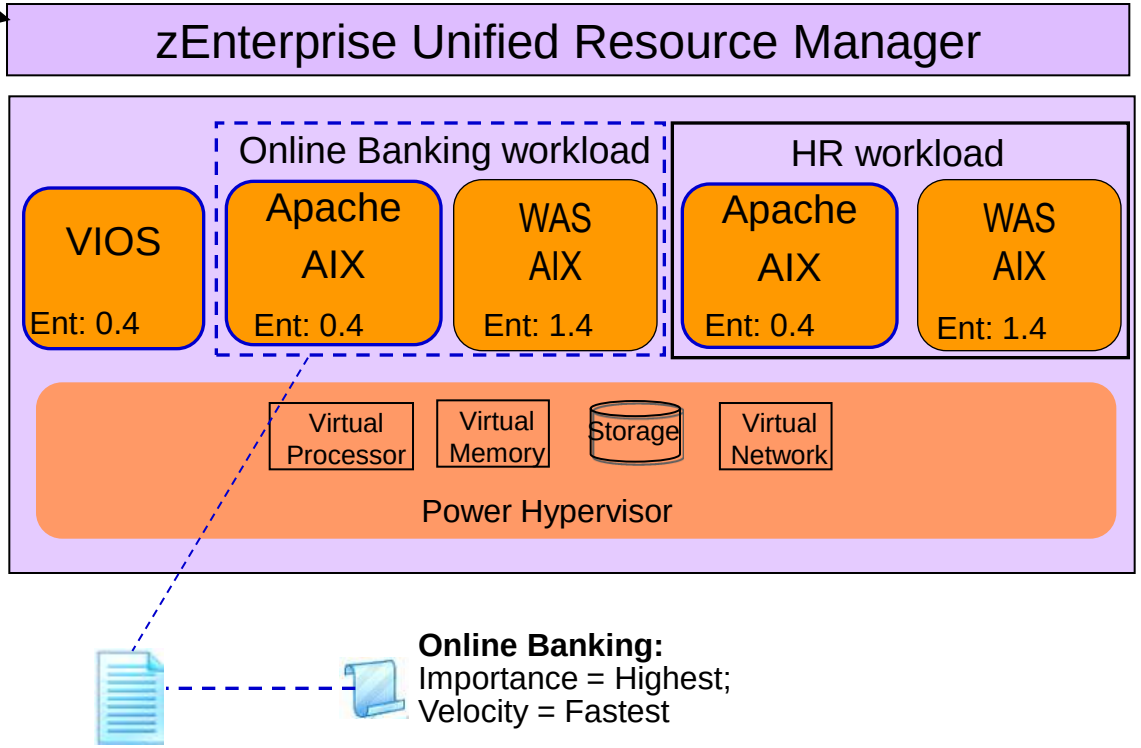
Dynamic adjustment of resources – no need to overprovision!

Example: Define Performance Goals

Hardware Management Console (HMC)



1. Name workload (e.g. Online banking workload)
2. Select virtual servers to group under workload
3. Create performance policies
4. Create service classes for the policy; define importance, velocity and classification rules for each service class



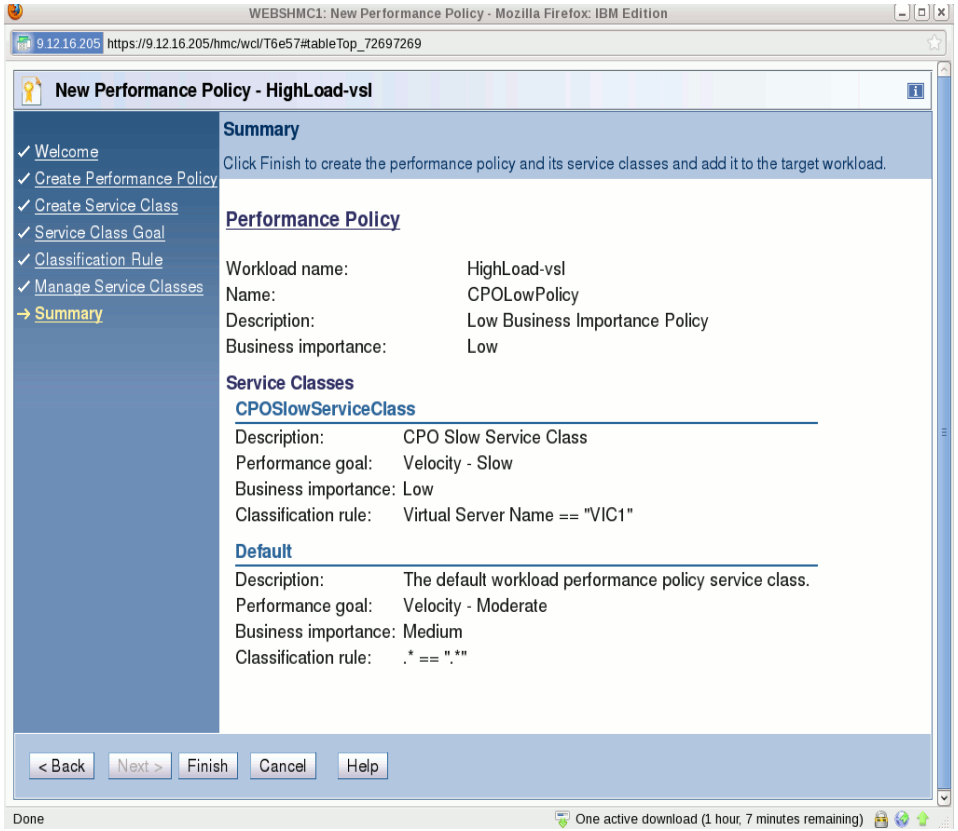
Dynamic Adjustment of CPU Resources

- zManager collects performance data (wait/running ratio, utilization) for each virtual server
  - Historical data used to change CPU entitlements of workloads

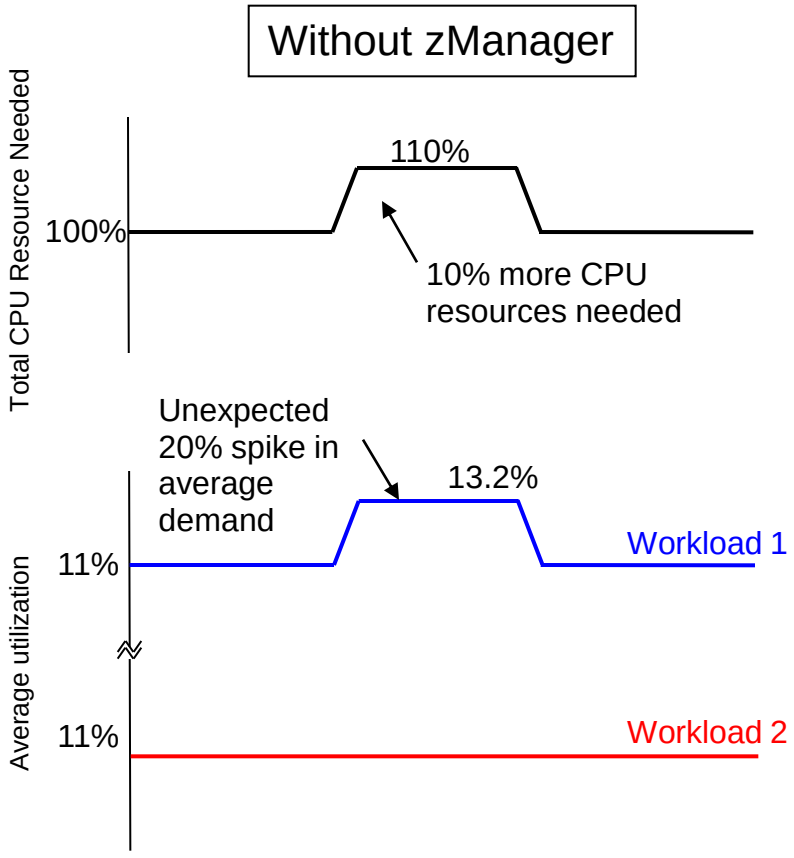
- If service class is not meeting its goal, zManager adjusts entitled processor capacity of virtual servers as appropriate
  - For z/VM guests
    - Adjust CPU allocation across guests with relative CPU shares
  - For p blades
    - Raise processor entitled capacity to give virtual servers more CPU resources that are missing their goals
  - Resources adjusted are done among virtual servers under the same hypervisor

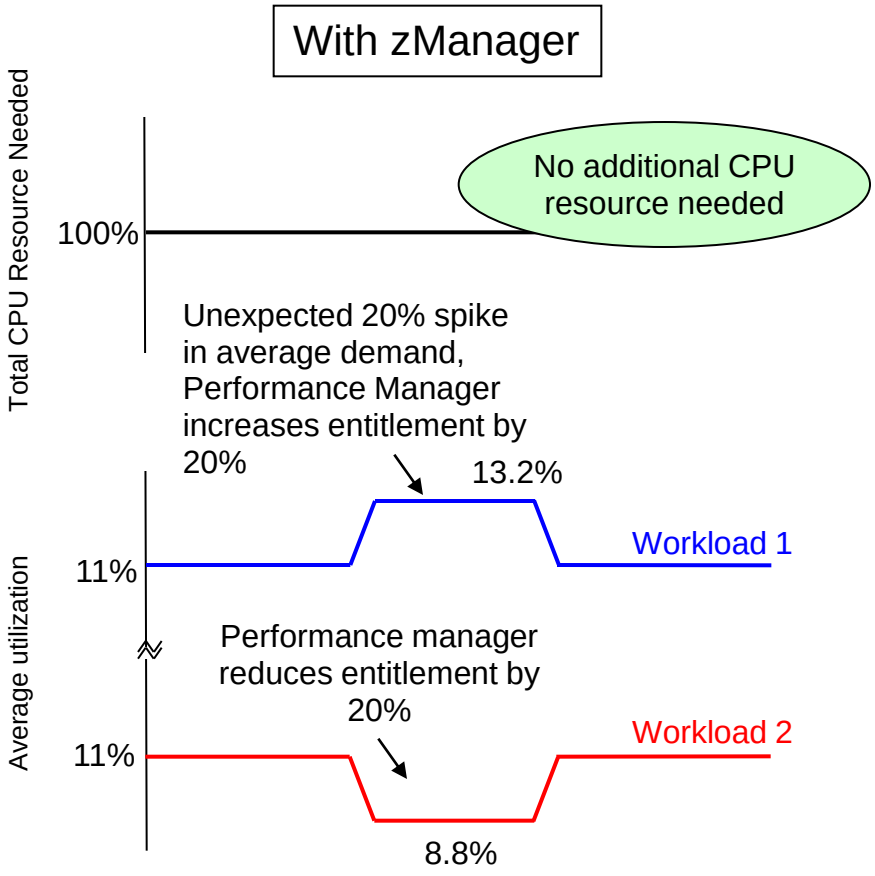
DEMO: Dynamic Adjustment of CPU Resources with zManager

- Define performance goals for workloads
- Set interval and alerts
- zManager automatically adjusts CPU resources to enable workload to meet their goals
- View performance data and resource adjustments with reports



zManager Performance Management Reduces Need to Overprovision CPU Resource



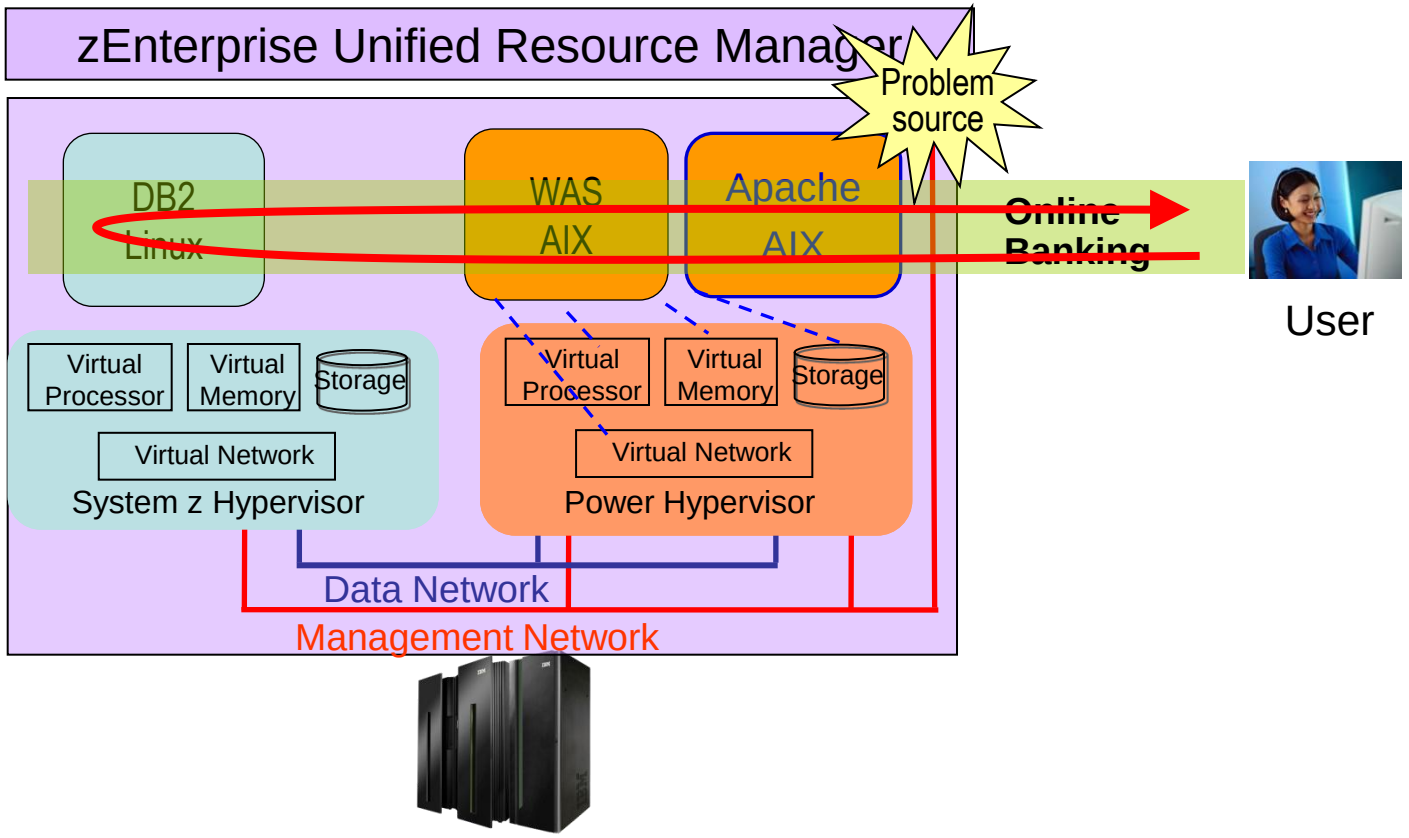


Must overprovision CPU resource for both workloads by 10% to handle unexpected spike in demand

Performance manager enables trading off resource from lower importance workload, avoiding the need to overprovision

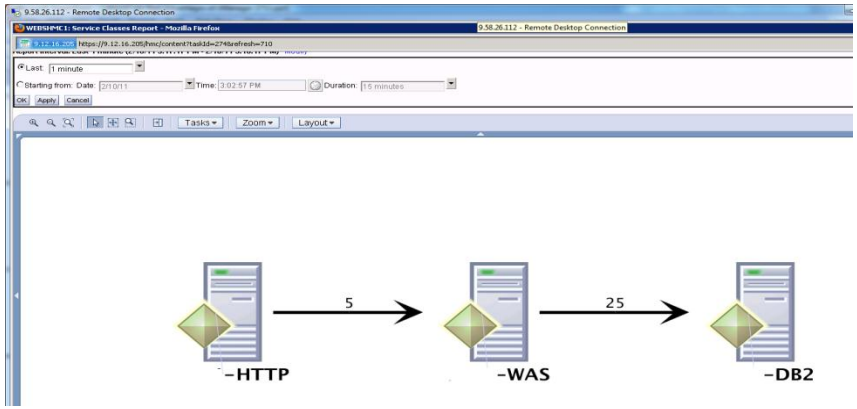
Monitor and Manager Transactions Centrally to Reduce Labor Costs

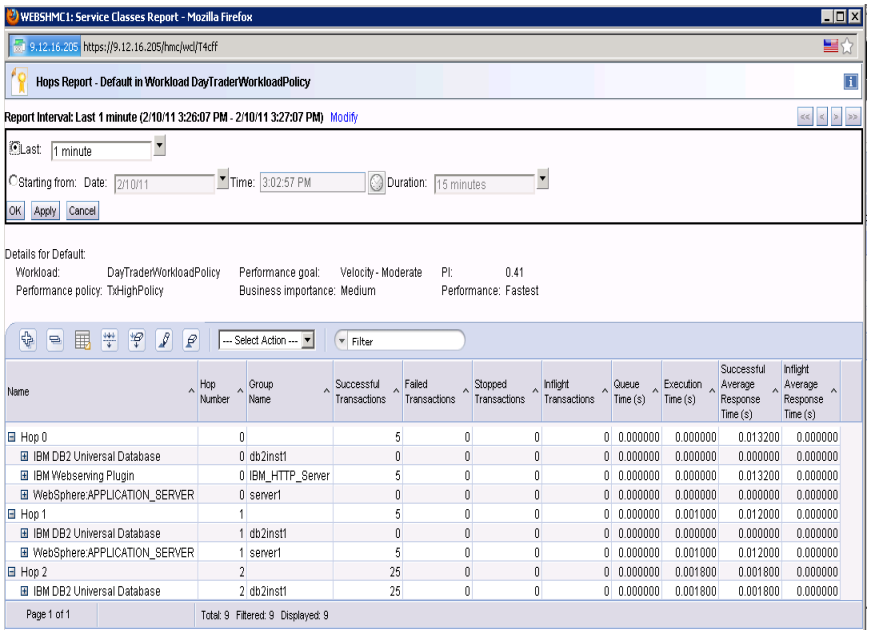
- View topology of workload running on multiple heterogeneous virtual servers and tracks transaction performance end-to-end
- Isolate source of performance problem across web servers, WebSphere and DB2



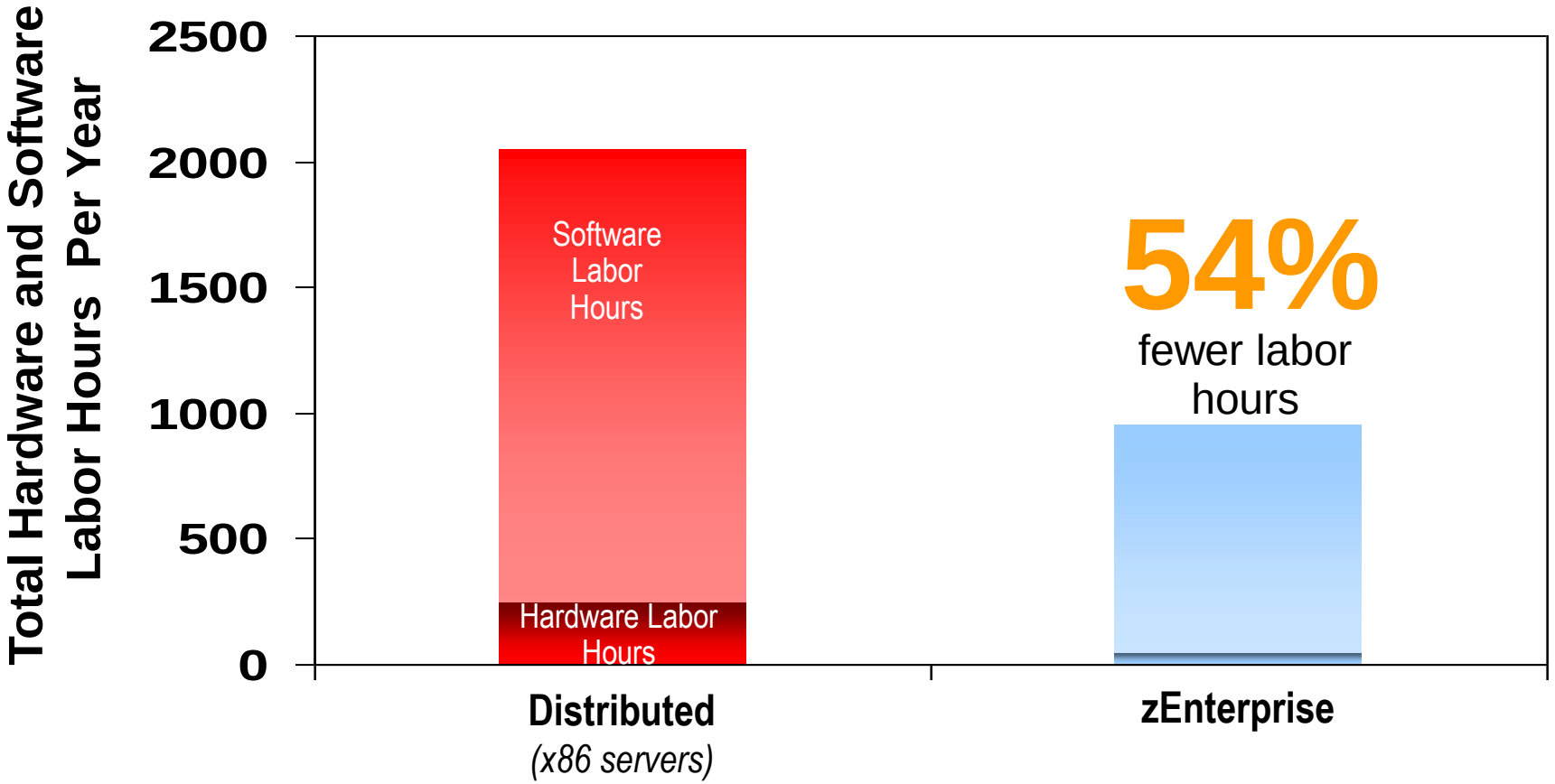
DEMO: Monitor Performance of Transactions End-to-End with zManager

- View topology of virtual servers assigned to a workload
- View transaction statistics for the application environment with hops report
  - Successful transactions
  - Failed transactions
  - Stopped transactions
  - In flight transactions
  - Queue time, execution time, response time



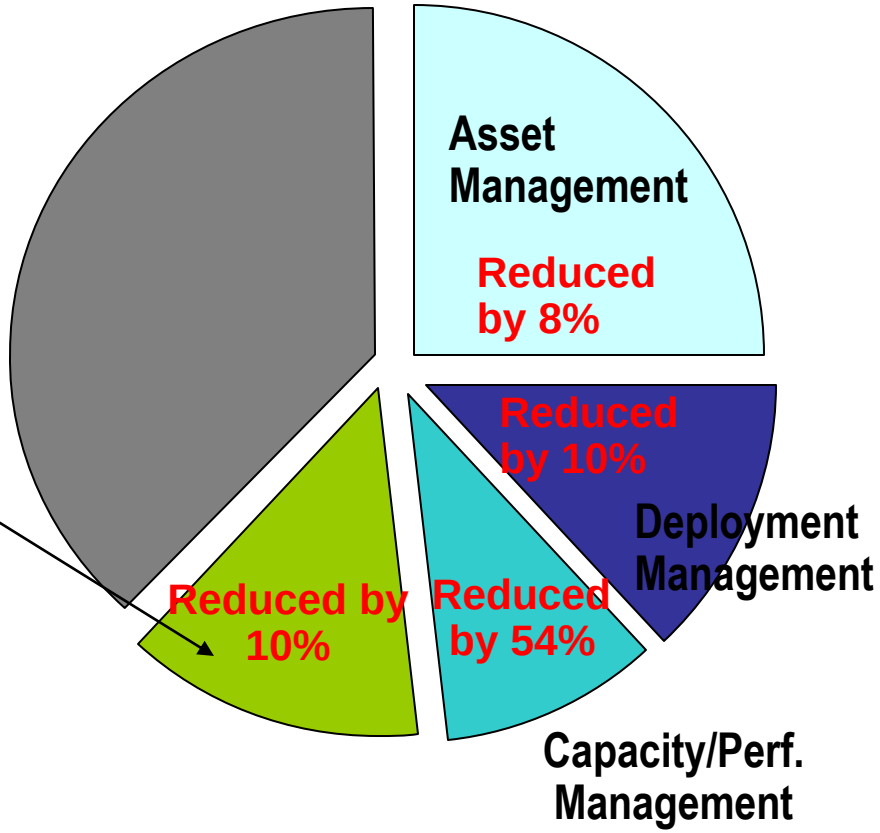


Capacity/Performance Management Productivity Improvements Drive Down Labor Costs



Example - Cost Reduction Strategies

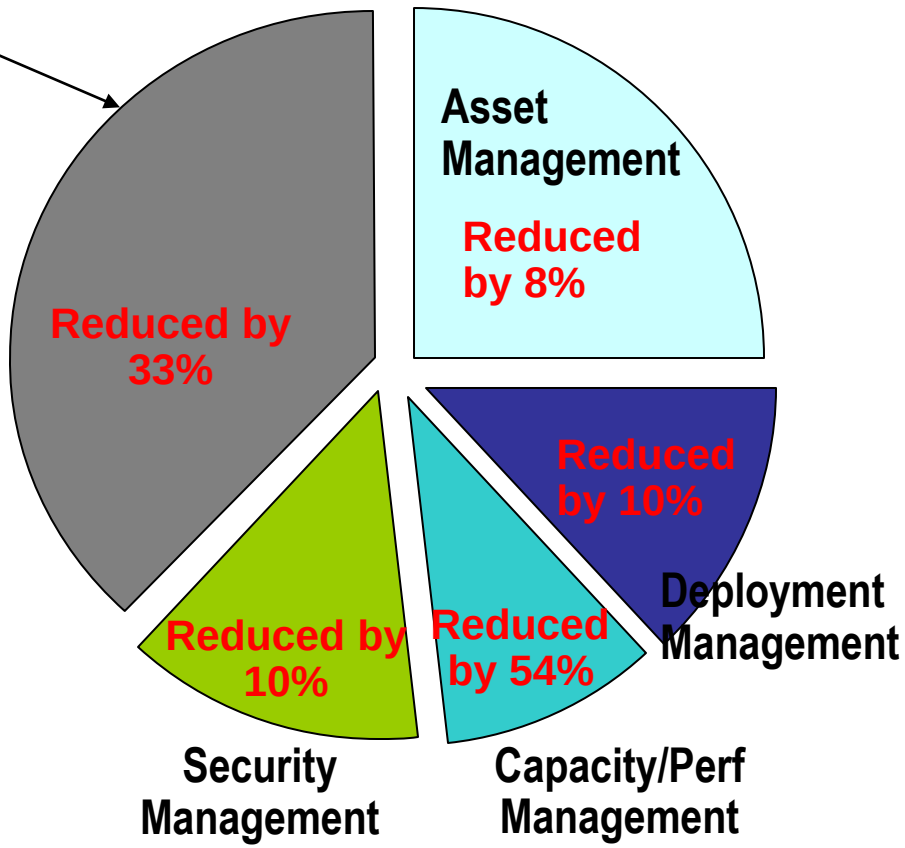
- **Reduce security management costs**
  - Centralized management of **fine-grain users access to resources** via customized user profiles improves productivity



Based on IBM internal study.
Labor model based on customer provided data from IBM studies

Example – zEnterprise Labor Cost Reduction Strategies

- **Reduce change management costs**
  - Standardization of deployed images reduces number of unique changes that need to be made
  - Visibility into relationships of various resources in an ensemble reduces time to determine the impact of a change
    - View blades in the context of an ensemble
    - View firmware information, retrieve changes and apply them to blades



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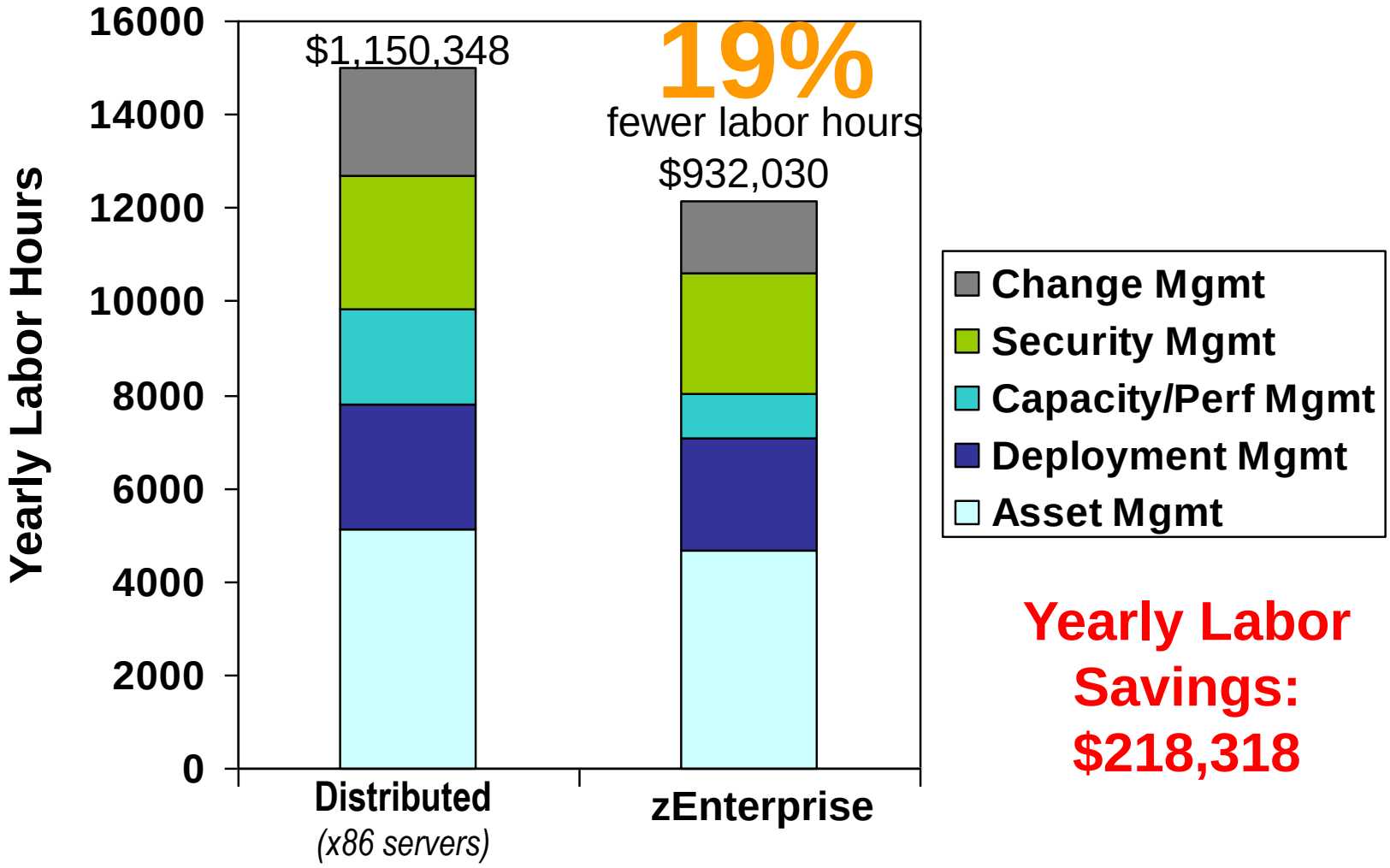
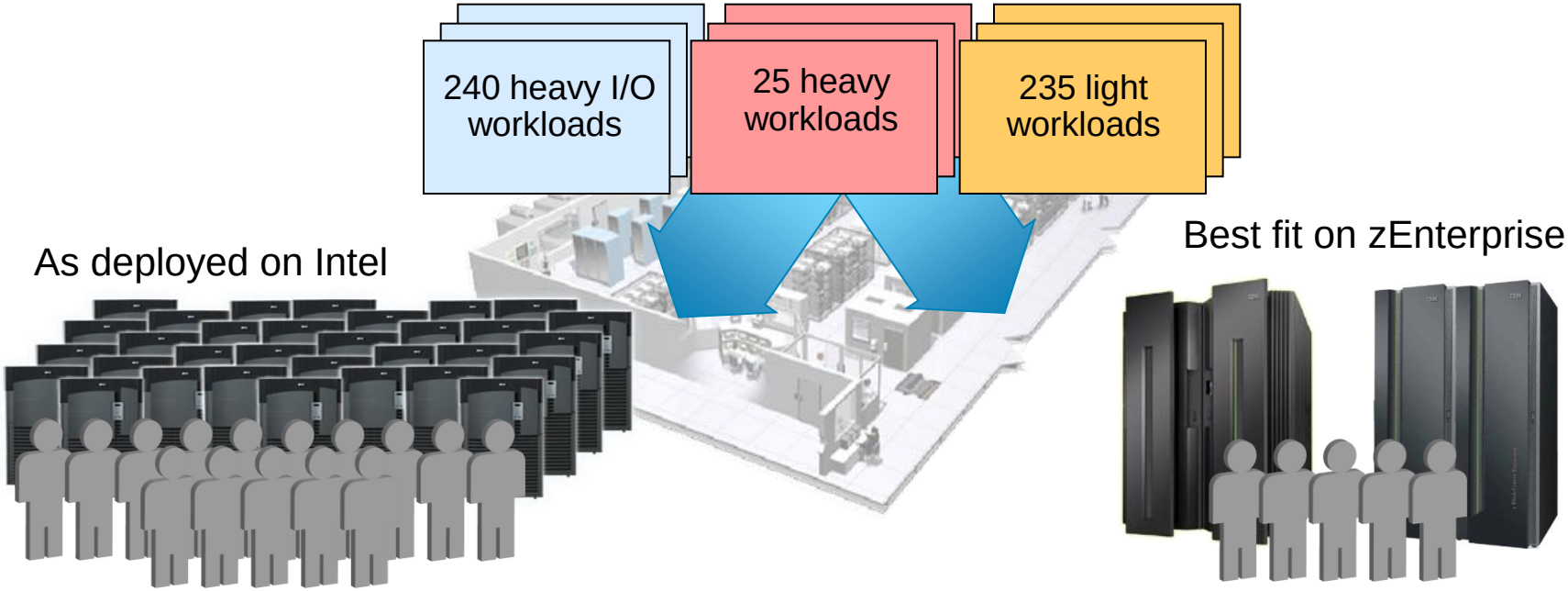
Centralized, Structured Management with zManager Cuts Infrastructure Labor Hours



Compare Labor Costs For Three Years



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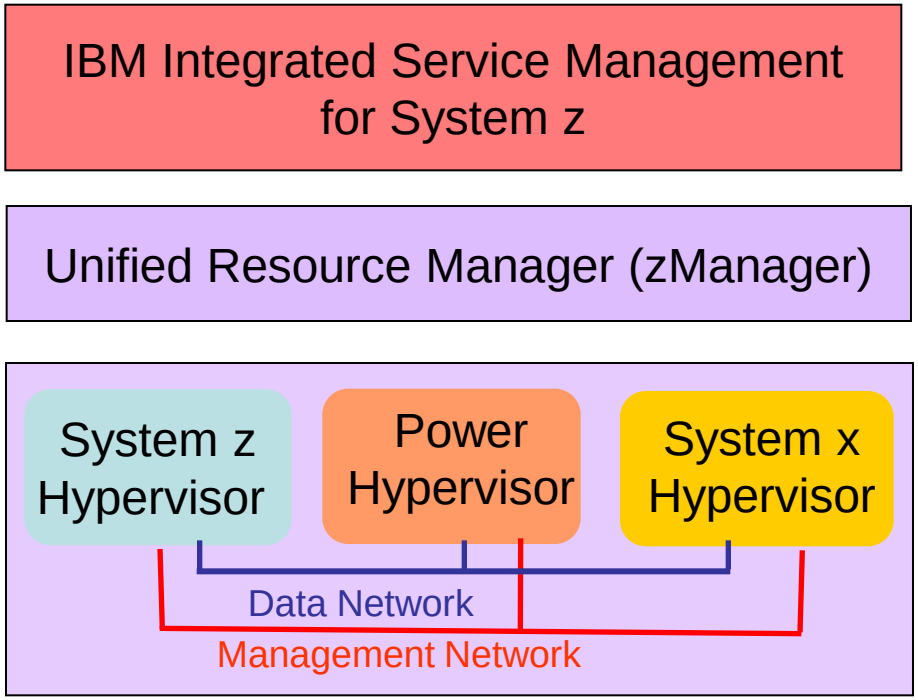
Reduce Labor Costs Further With IBM Integrated Service Management for System z

- IBM Tivoli Asset and Financial Management for zEnterprise
  - Measure and track costs of business services, including resource usage, software and vendor contracts across all IT resources
- IBM Tivoli Application Management for zEnterprise
  - Provide end-to-end transaction breakdown across environments, along with deep-dive problem resolution tools to isolate and resolve performance issues quickly
- IBM Tivoli Application Resilience for zEnterprise
  - Automate tasks required to startup, shutdown, and restart composite applications to adjust capacity
  - Shrink batch windows by planning, orchestrating, and executing multiple batch- and event-driven workloads in parallel while maintaining cross-environment dependencies
- IBM Tivoli Security for zEnterprise
  - Centrally manage compliance, reduce vulnerability and protect access to applications and data

zEnterprise And Tivoli Support Structured Management Practices For All Workloads



End-to-End Service Management

Integrated Platform Management

Integrated Fit-for-Purpose Platform

zEnterprise

Extends System z quality of service to all environments