Service Management Drives Savings

Understand All The Operational Costs

Annual Operations Cost Per Server
(Averaged over 3917 Distributed Servers)

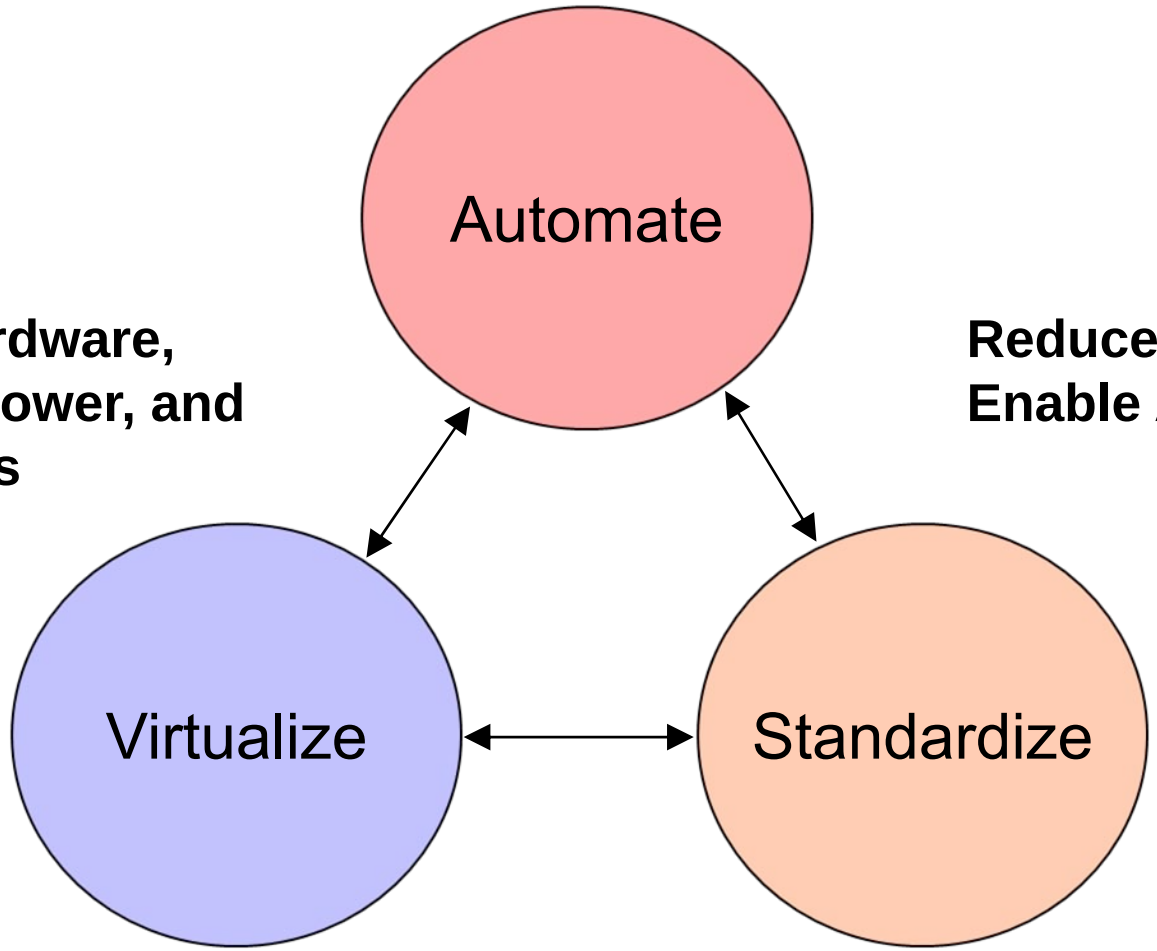
Power	$731
Floor Space	$987
Annual Server Maintenance	$777
Annual connectivity Maintenance	$213
Annual Disk Maintenance	$203
Annual Software support	$10,153
Annual Enterprise Network	$1,024
Annual Sysadmin	$20,359
Total Annual Costs	$34,447

The largest cost component was **labor** for administration
7.8 servers per headcount @ $159,800/yr/headcount

Source: IBM internal study

A Virtuous Circle To Reduce I/T Costs

Reduce Labor Costs
Improve Service



Reduce Hardware, Software, Power, and Labor Costs

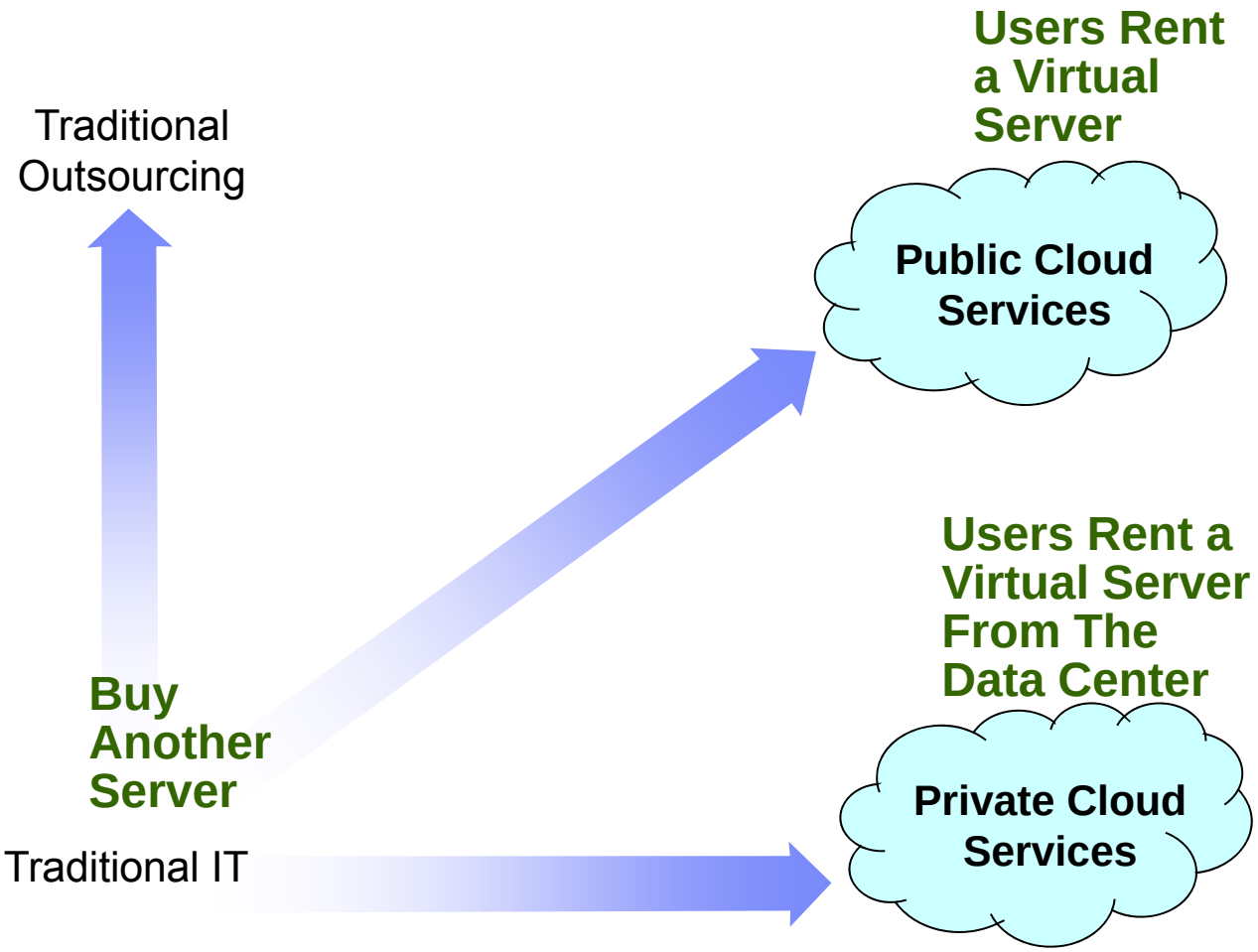
Reduce Labor Costs Enable Automation

Public Cloud Providers Are Leveraging This Virtuous Circle

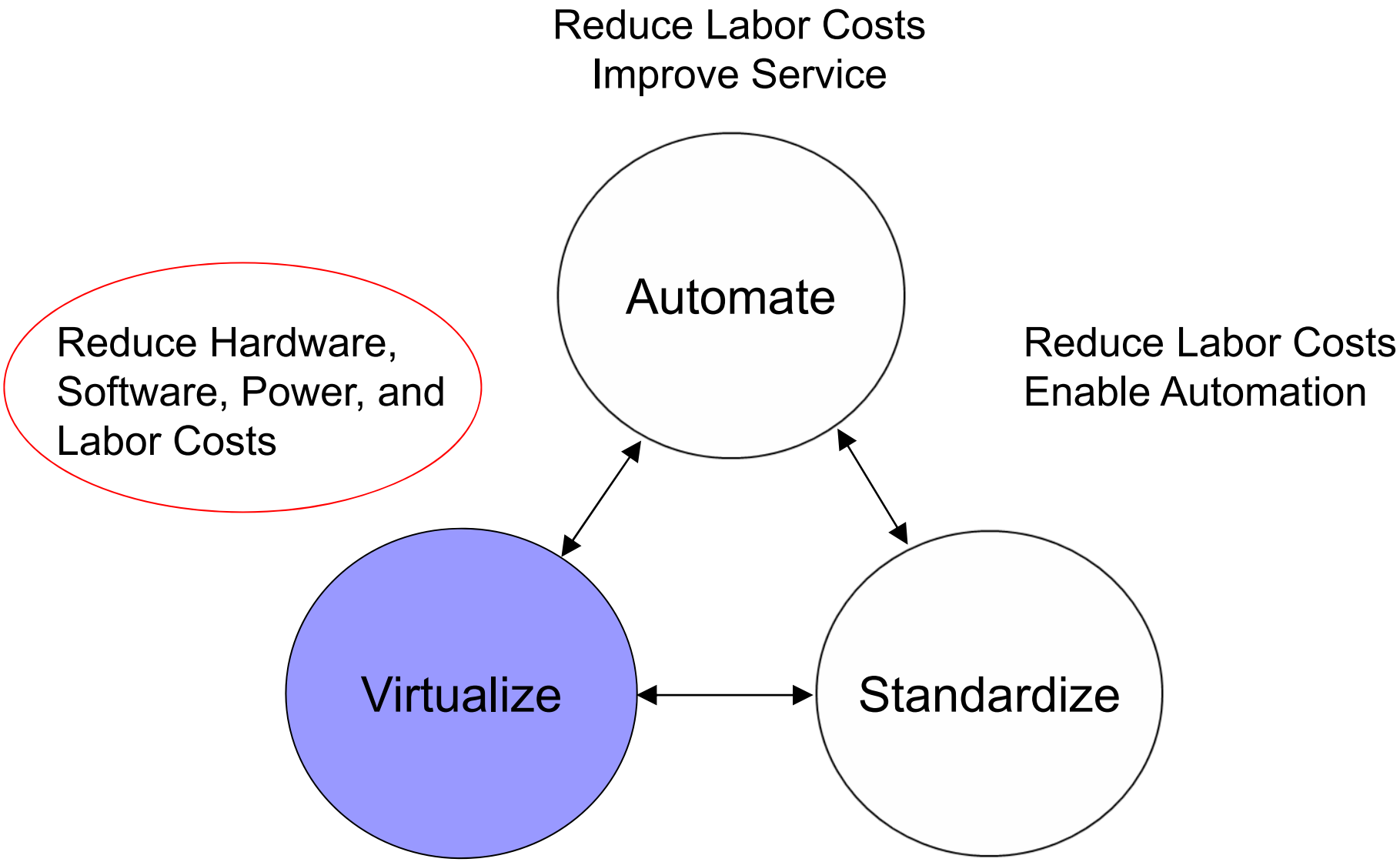
- Low cost, pay-per-use model seen as more cost-effective
  - Amazon EC2: $0.10/hour (small Linux/UNIX instance)
- Near-immediate provisioning enables users to respond at market speed
  - 64-node Linux cluster available in 5 minutes on AWS vs. 3 months internally[1]
- Line-of-business units can now go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

[1] http://www.informationweek.com/cloud-computing/blog/archives/2009/01/whats_next_in_t.html

Which Option Achieves the Lowest TCO?



A Virtuous Circle To Reduce I/T Costs



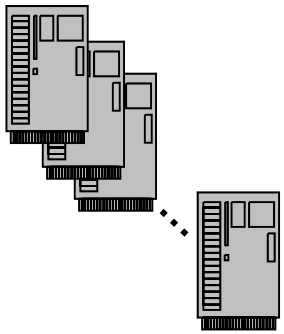
How Many Workloads Can Be Consolidated? An Online Banking Benchmark Comparison

40 servers to one frame

5 servers to 1 IFL core

20 cores to 1 IFL core

Intel servers x366
- **4 cores @ 3.66 GHz**
- **12 GB memory**

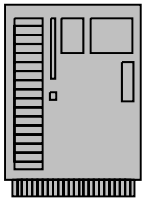


Workload for each server:
- **5% utilization**
- **40 ms response time**
- **4.5 tps**

Case 1: Consolidate to z/VM

zLinux z10-EC
- **8 IFL cores @ 4.4 GHz**
- **256 GB memory**

Case 2: Consolidate to x86 hypervisor



Intel server x3950
- **8 cores @ 3.5 GHz**
- **64 GB memory**

8 servers to one frame

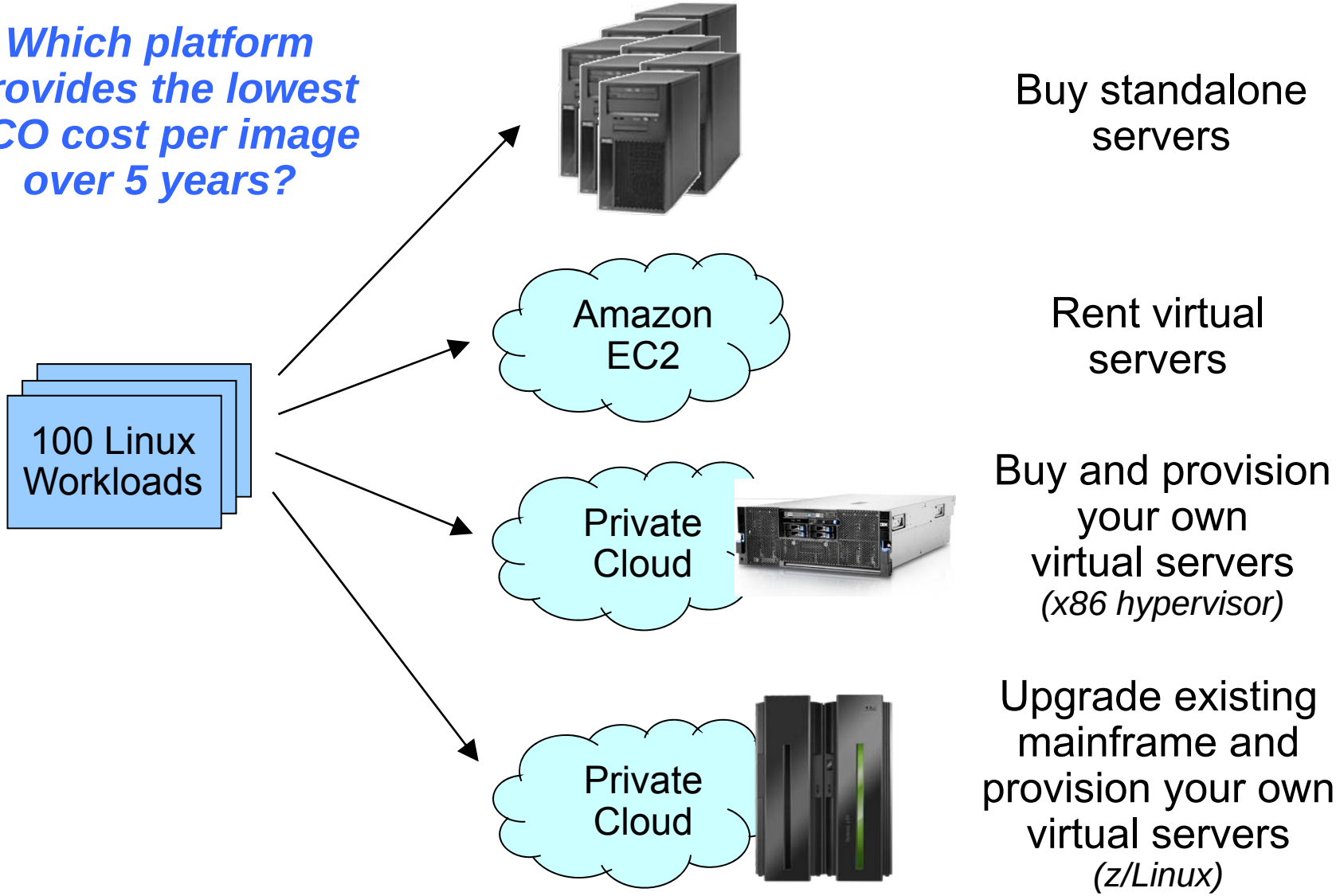
1 server to 1 core

4 cores to 1 core

Each VM image run on
- **4 virtual cores**
- **1 GB virtual memory**

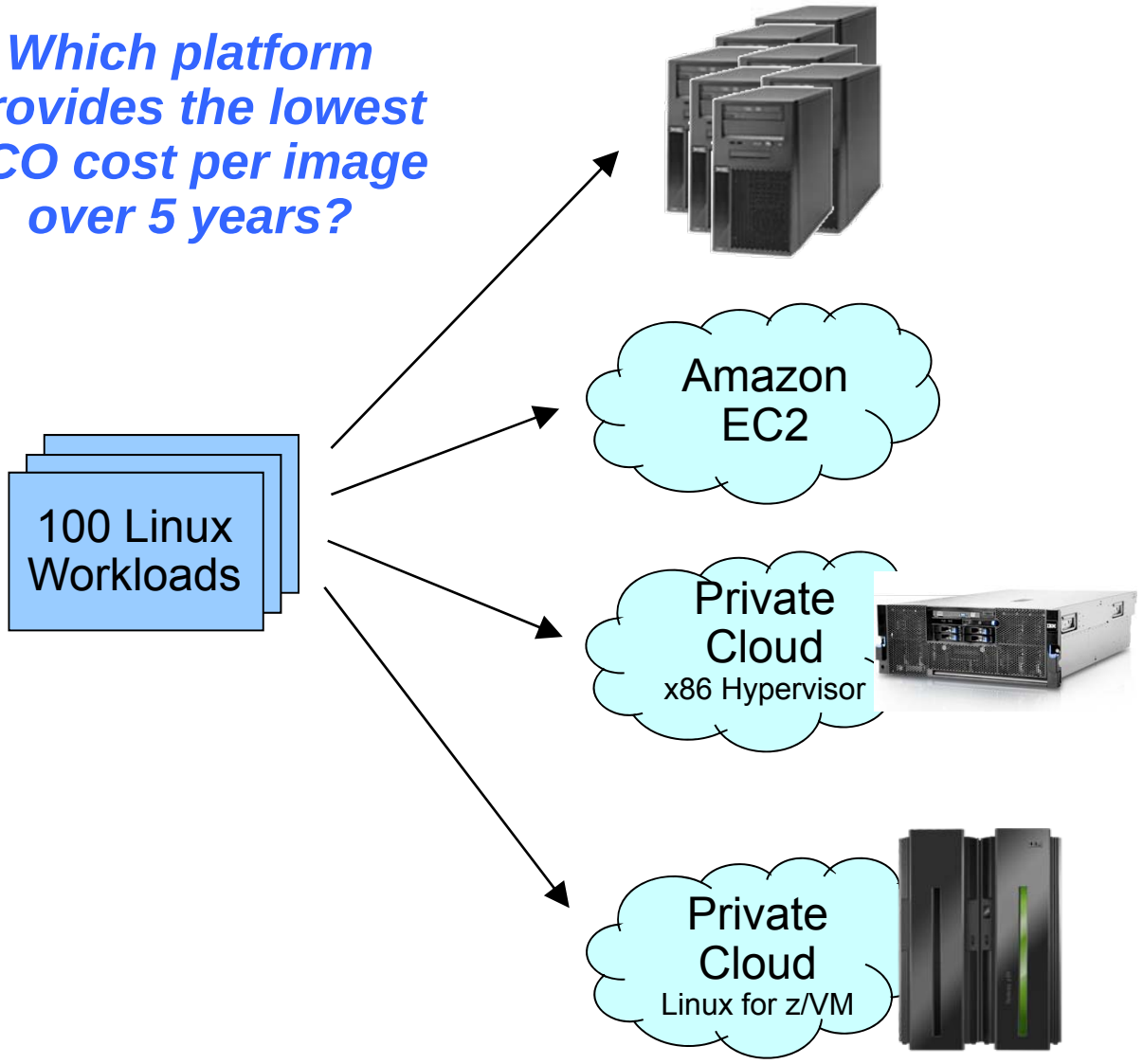
Example – What Is The Lowest Cost Way To Support 100 Linux Workloads?

Which platform provides the lowest TCO cost per image over 5 years?



Use Benchmark Ratios To Estimate How Many Servers Are Required

Which platform provides the lowest TCO cost per image over 5 years?



Requirements

Buy 100 IBM x3250 4-core servers

100 Amazon EC2 instances

13 IBM x3950 8-core servers
(100/8 = 12.5 -> 13)

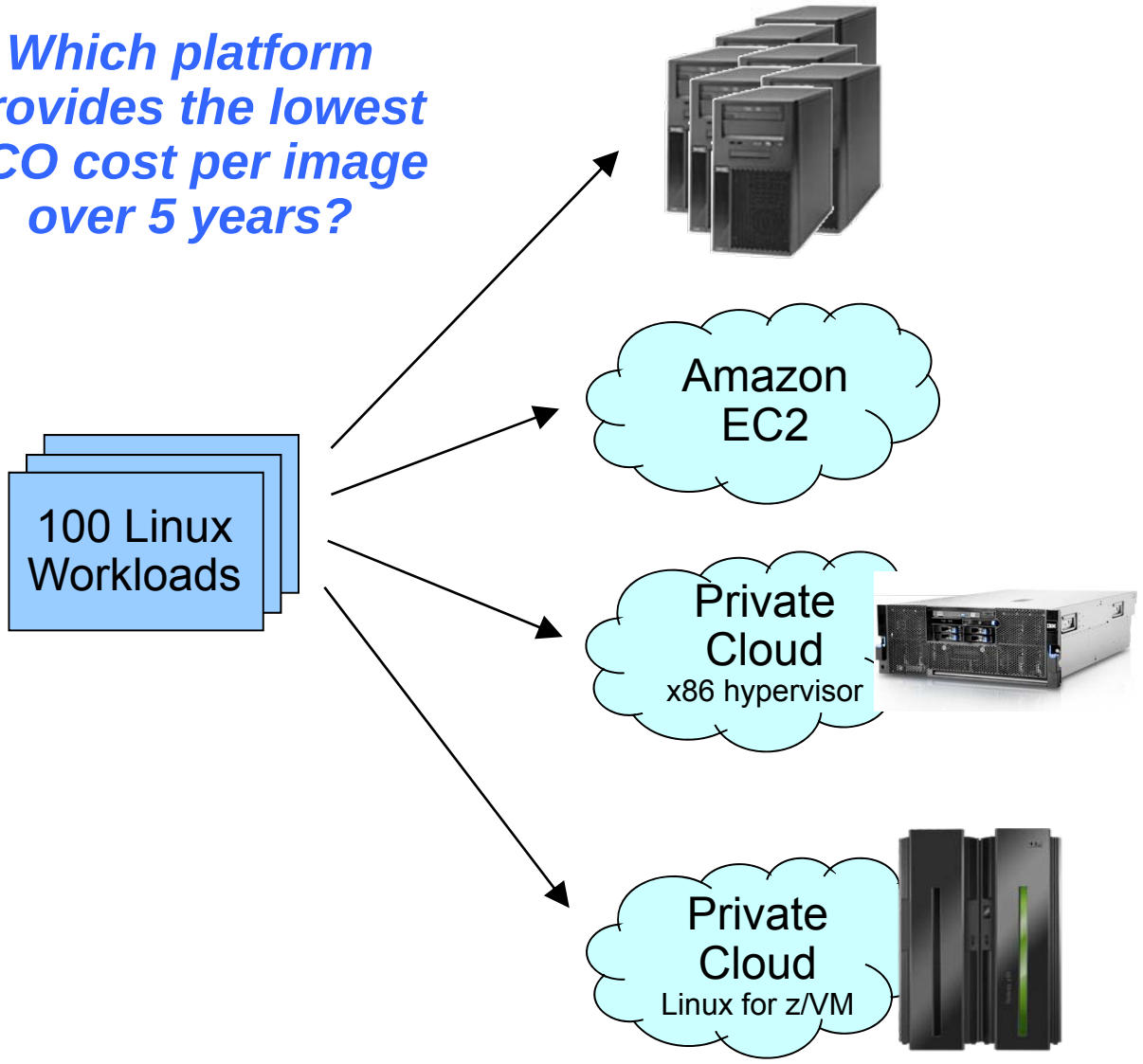
Add 20 IFLs to **existing** IBM z10 EC
(100/5 = 20)

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

Use Benchmark Ratios To Compare TCO - 100 Linux Workloads (1.7 Oversold)

Which platform provides the lowest TCO cost per image over 5 years?



Requirements

Buy 100 IBM x3250 4-core servers

Rent 100 Amazon EC2 instances

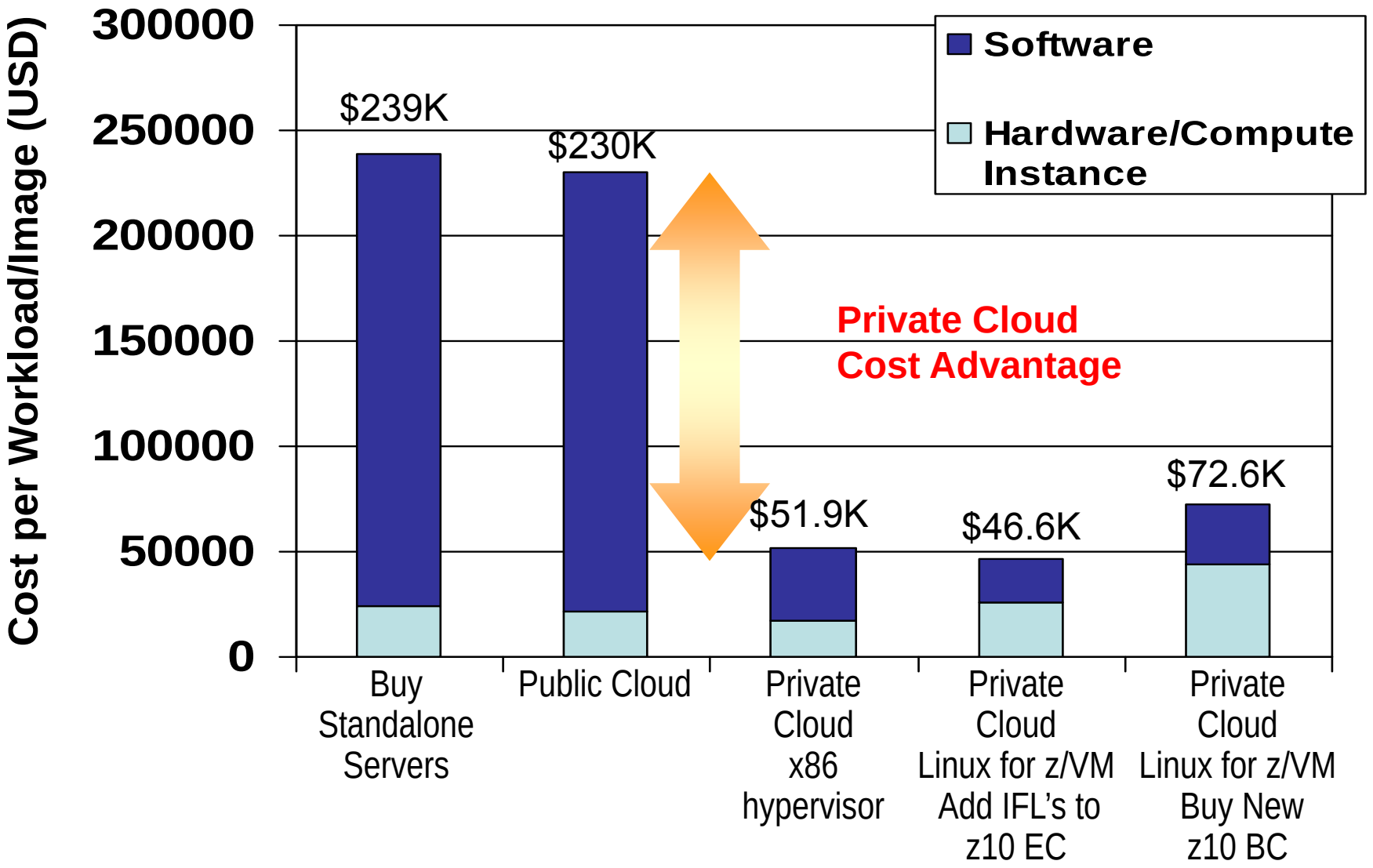
8 IBM x3950 8-core servers

100/(1.7 x 8) = 7.3 -> 8

12 IFLs on existing IBM z10 EC

100/(1.7x5) = 11.8 -> 12

Hardware And Software Costs Per Image for Linux Workloads (5 Yr TCO)



zLinux and x86 Hypervisor Are Close In Total TCO Costs

- However System z provides better qualities of service
  - A single frame can scale to handle 440 of these benchmark workloads with 64 IFL's*
  - Better platform reliability and serviceability
  - Higher I/O bandwidth
  - Opportunity to use RACF for consistent security
  - Systematic disaster recovery for zLinux workloads

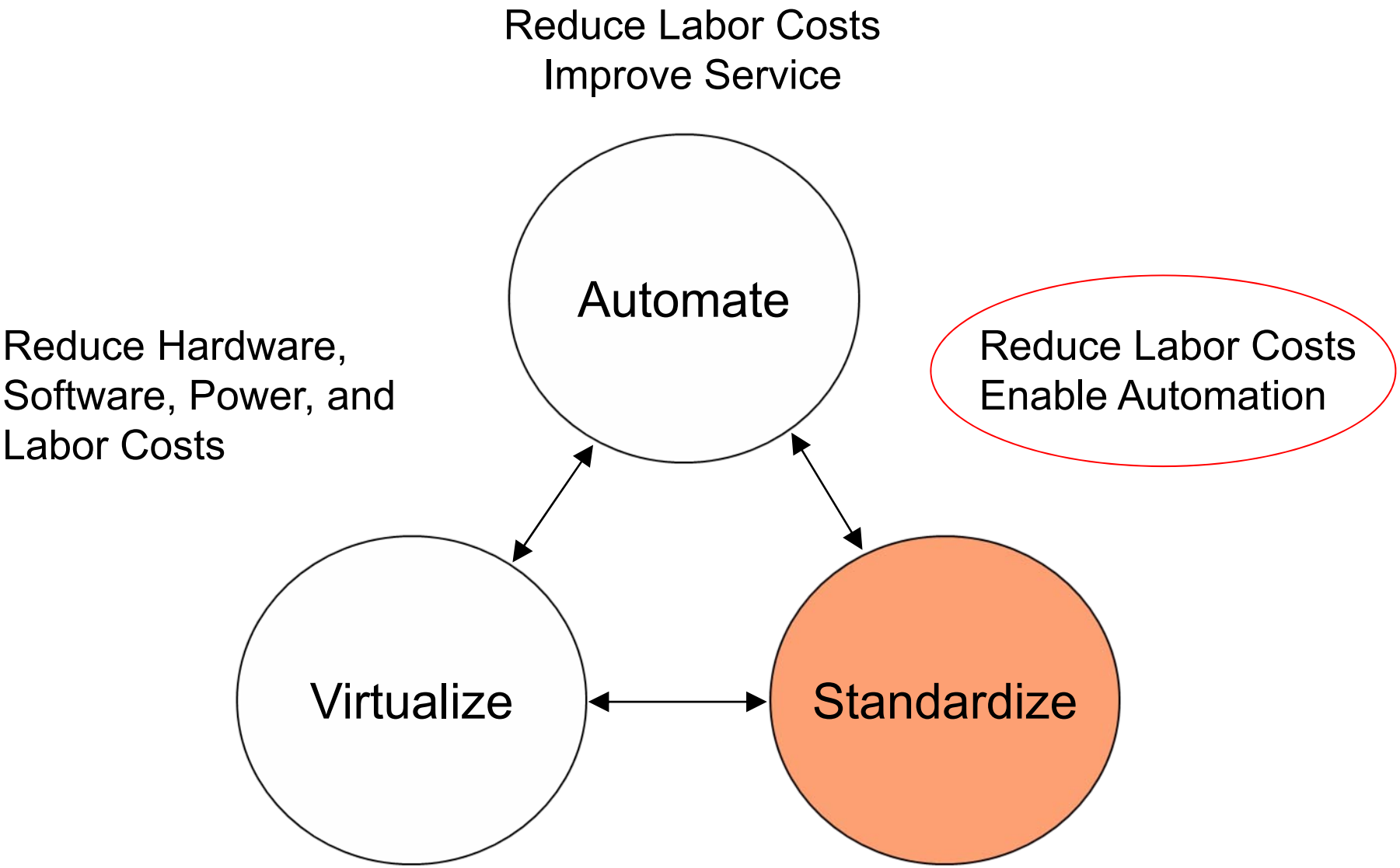
- And there are additional System z cost savings not yet discussed
  - Specialty processors are upgraded free when upgrading
  - New pricing for Solution Edition For Enterprise Linux

* Two z/VM hypervisors with 32 IFLs each

Project ‘Big Green’: Virtualization and Consolidation Within IBM Data Centers

- IBM launched major virtualization initiative in August 2007 (Project ‘Big Green’)
- Goal: consolidate 3900 servers to approximately 30 IBM System z mainframes running Linux
  - Status: have consolidated 2200 servers so far
- Anticipated savings when completed: 80% less energy, 85% less floor space

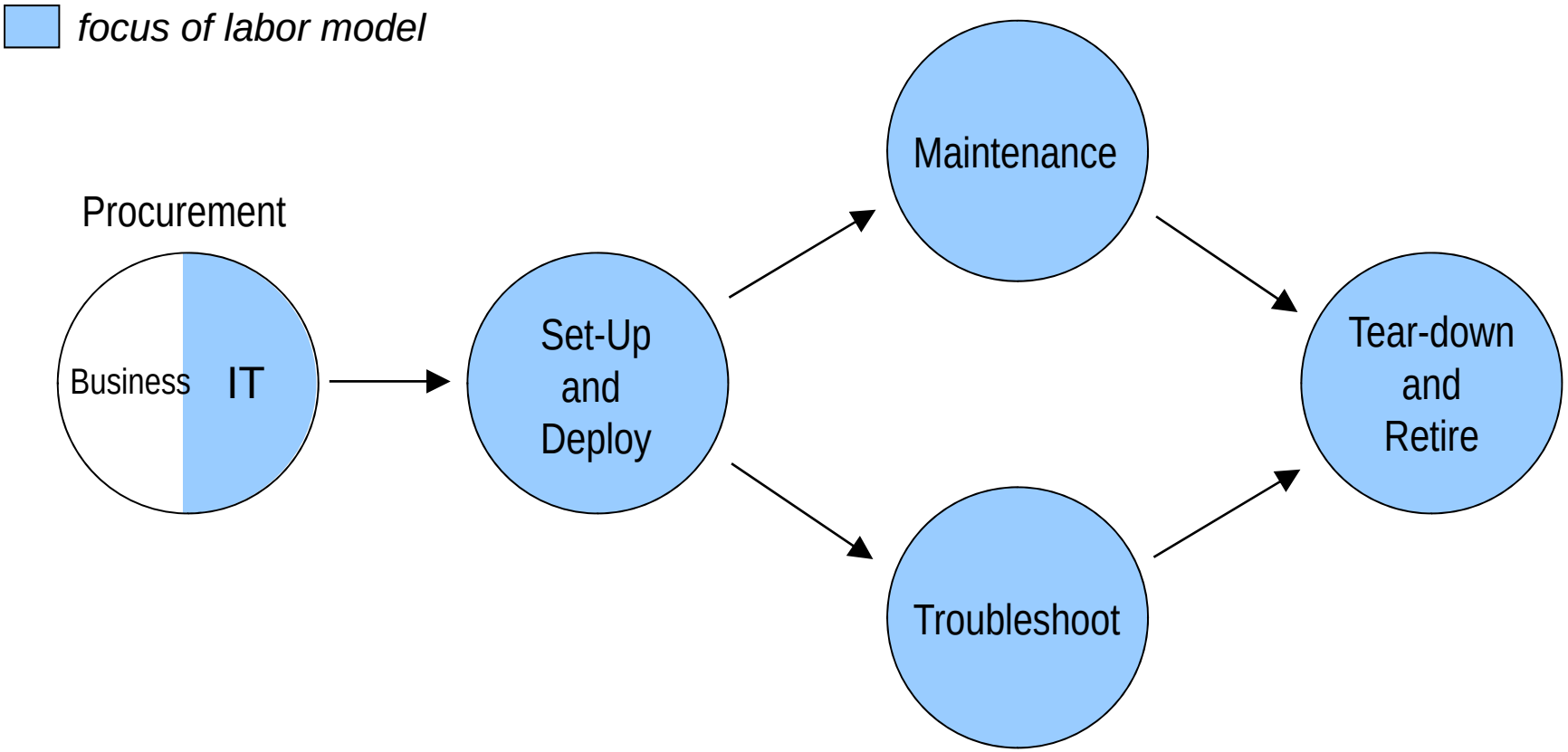
A Virtuous Circle To Reduce I/T Costs



Standardization

- 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
  - We call this image “cloning” and will introduce a Clone Factor

Server Provisioning Lifecycle: Labor Components



- The labor cost of these activities is typically stated as “Servers per FTE”, including hardware and software labor overall
- To quantify the benefits of standardization we need to separate out the software labor components

Labor Model For Servers – Best Fit To Field Data

Total Hardware Labor Hours **161hrs** | **# of Physical Servers** | + | **Total Software Stack Labor Hours** **178hrs** | **# of Software Images** | = | **Total Labor Hours**

Set-up +, Maintenance + Troubleshooting + Tear-down per server over a 5 year period

Set-up +, Maintenance + Troubleshooting + Tear-down per stack over a 5 year period

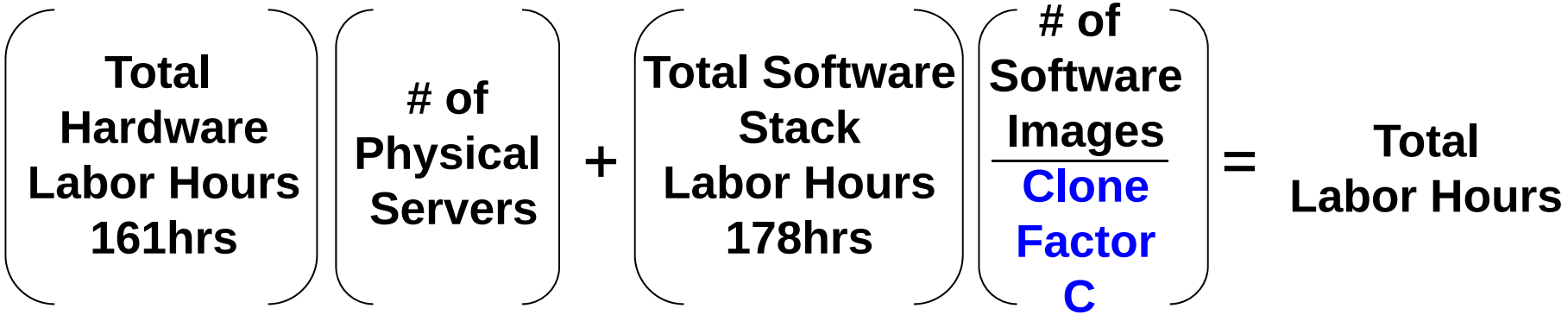
Over a 5 year period

161hrs x 100 + 178hrs x 100 = 33,909hrs

… or 30.7 Intel Servers per FTE

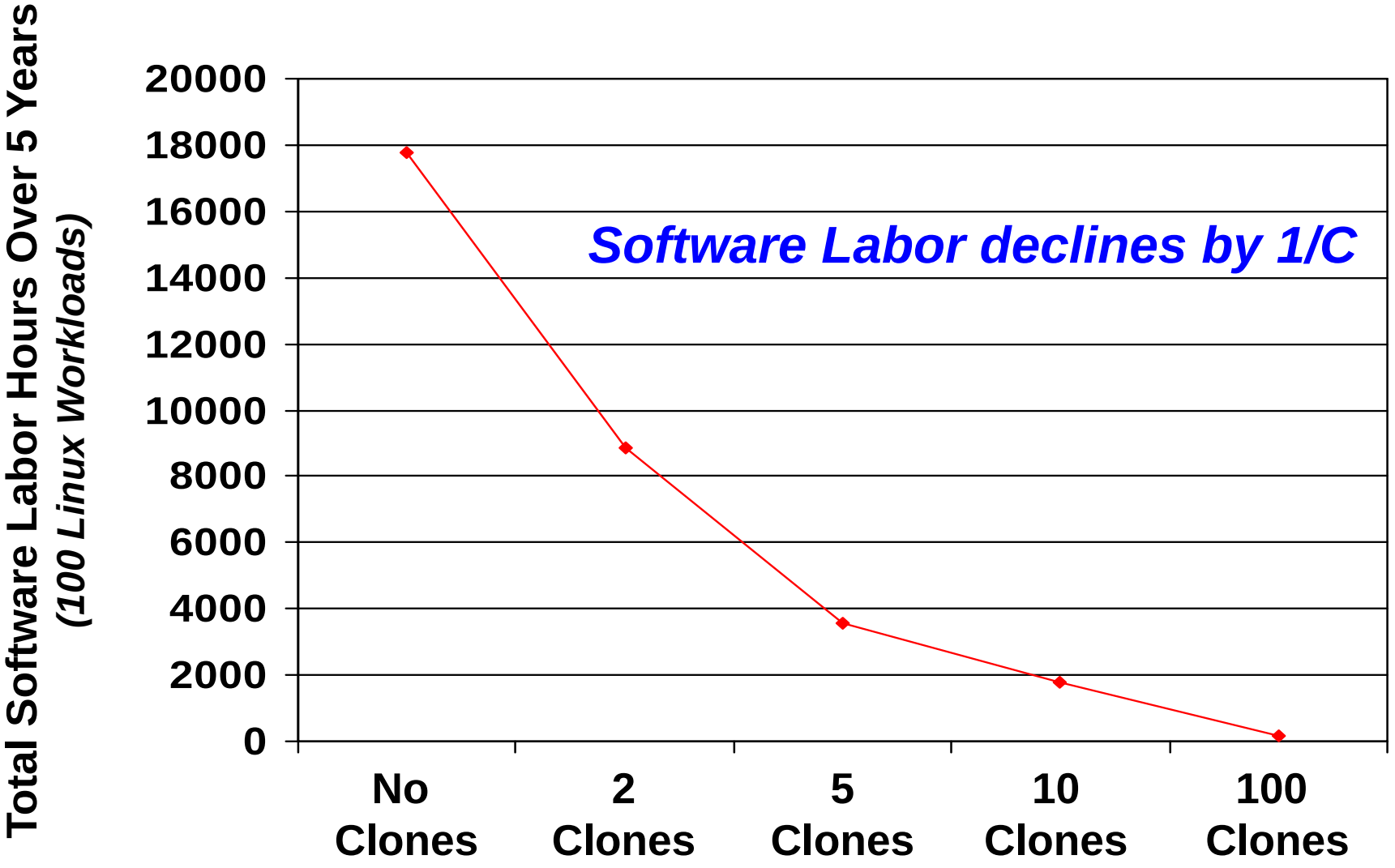
Use of Standardized Stacks Can Drive Down the Labor Hours for Virtual Images

This is the number of unique stacks

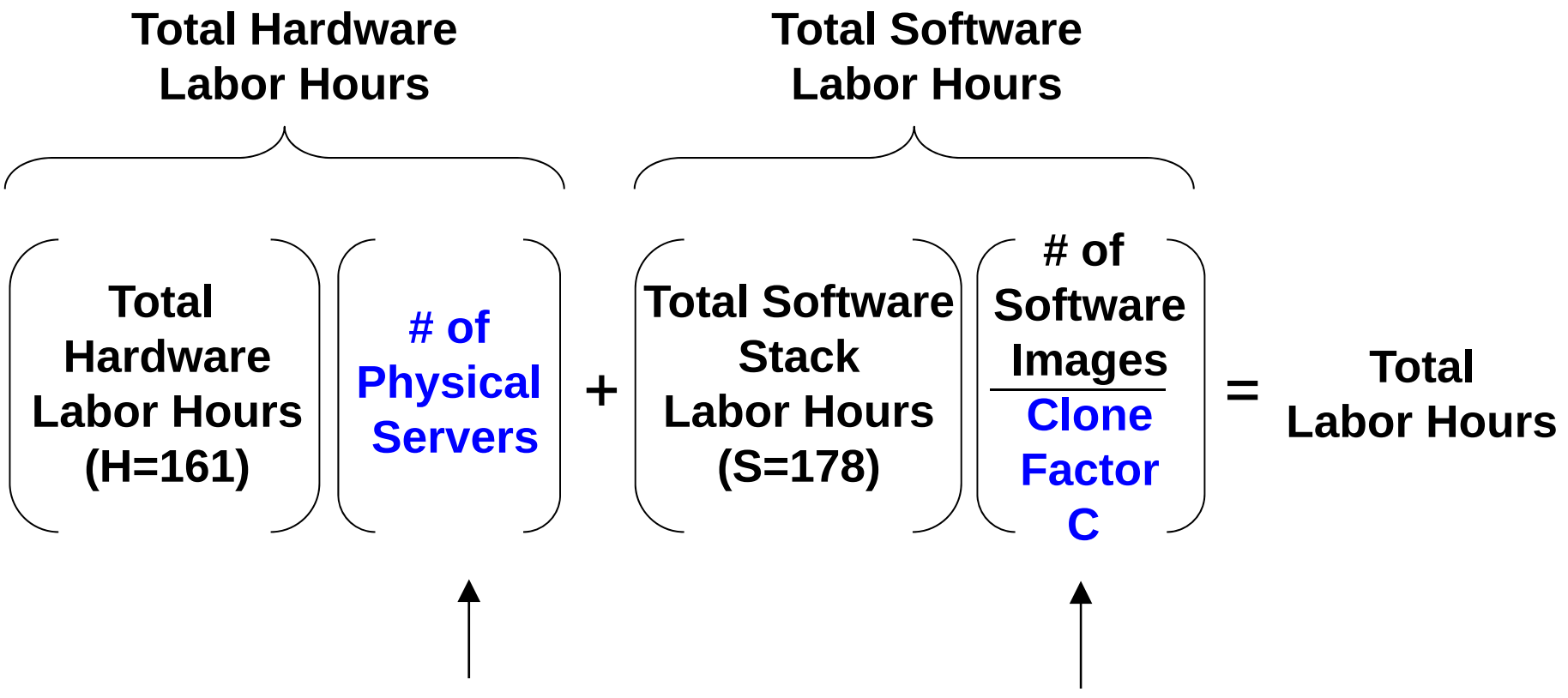


Where C = average number of copies deployed for each unique software stack (from 1 to 100 in our example)

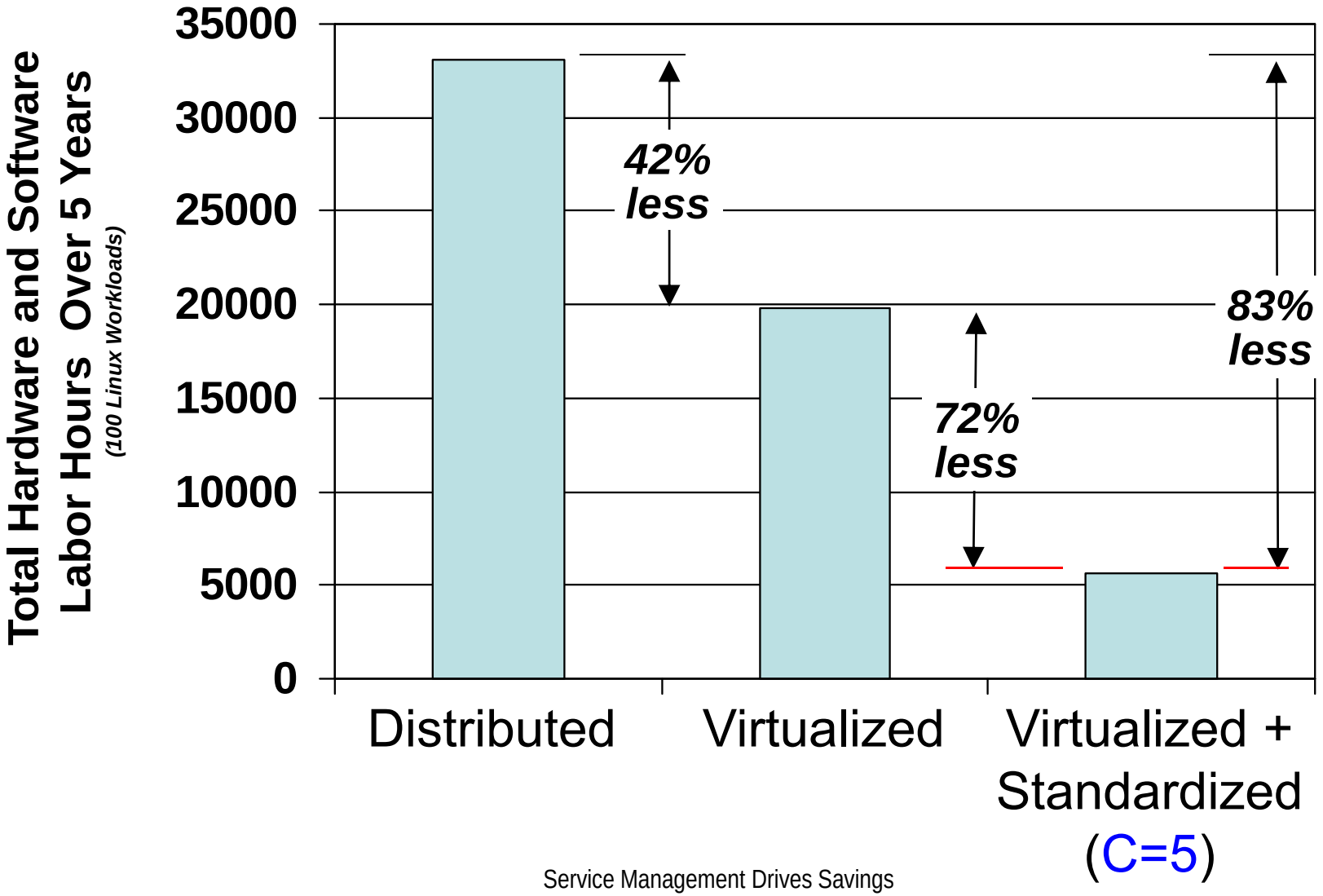
Benefit Of Cloning Factor On Software Labor Costs In A Virtualized Environment



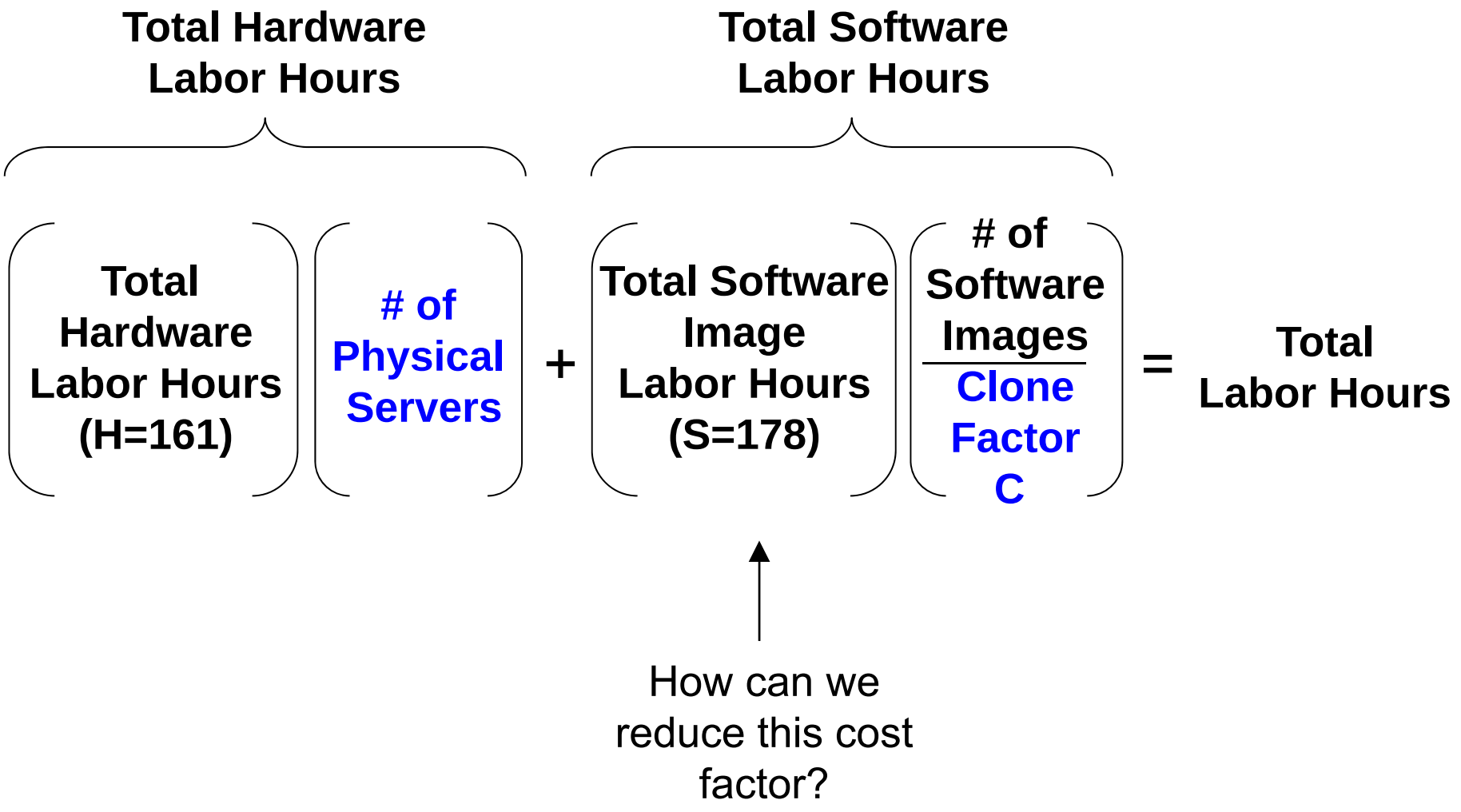
Effects of Virtualization and Standardization On Labor Costs



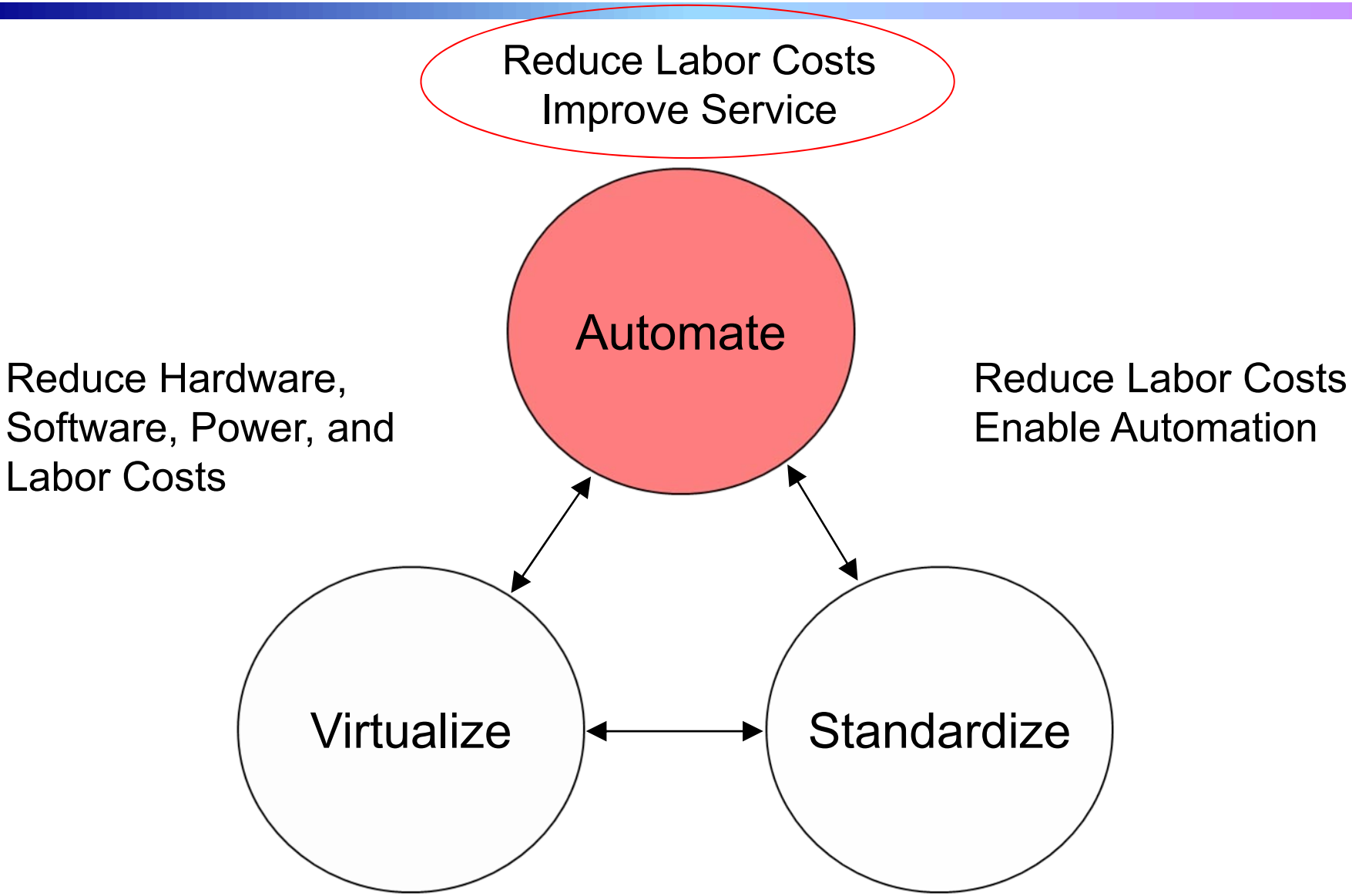
Total Hardware and Software Labor Costs for 100 Linux Workloads Over 5 Years



Effects of Virtualization and Standardization On Labor Costs



A Virtuous Circle To Reduce I/T Costs



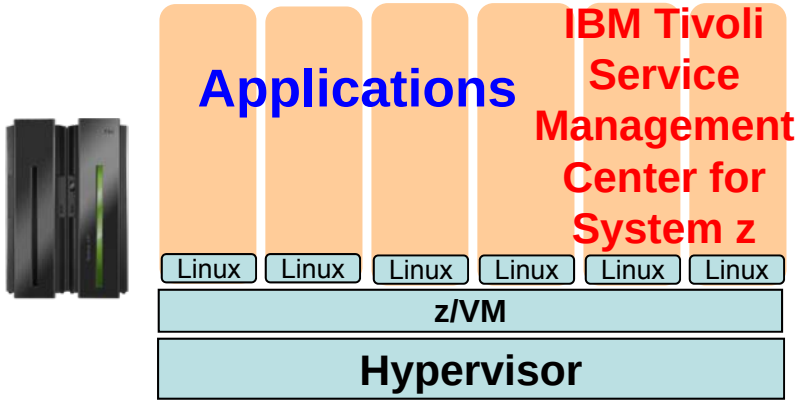
Service Management is the Key To Automation

- 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 standards menu 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

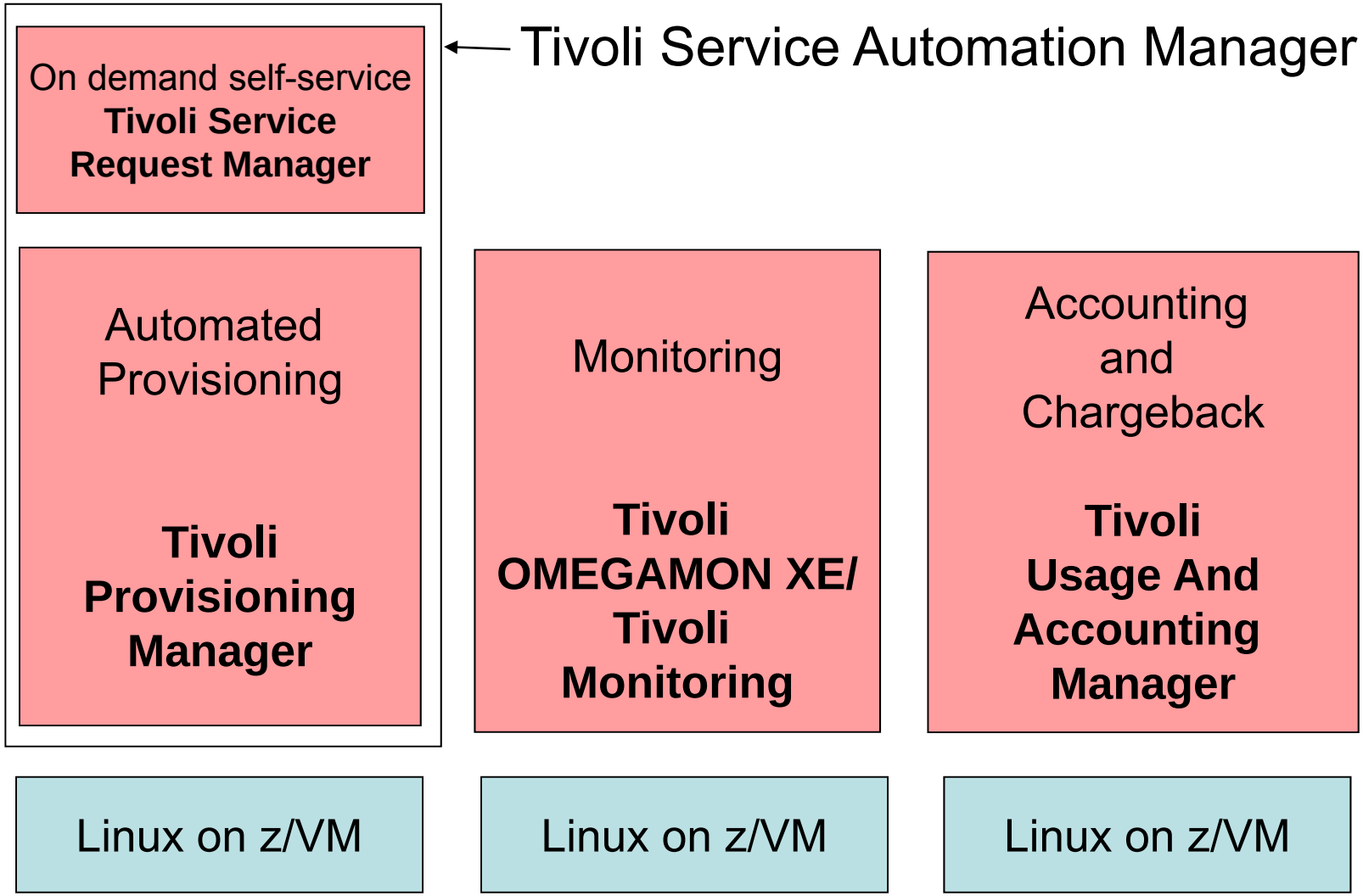
Use The Mainframe As The Service Management Hub for Your Private Cloud

- Consolidate management on the mainframe
  - Service Management hub on Linux on z
  - z/OS supported as a managed system
- Manage the Dynamic Infrastructure
  - Standardization
  - Best practices
  - Lowest Cost



Unconsolidated Environment

IBM Tivoli Service Management Center For System z

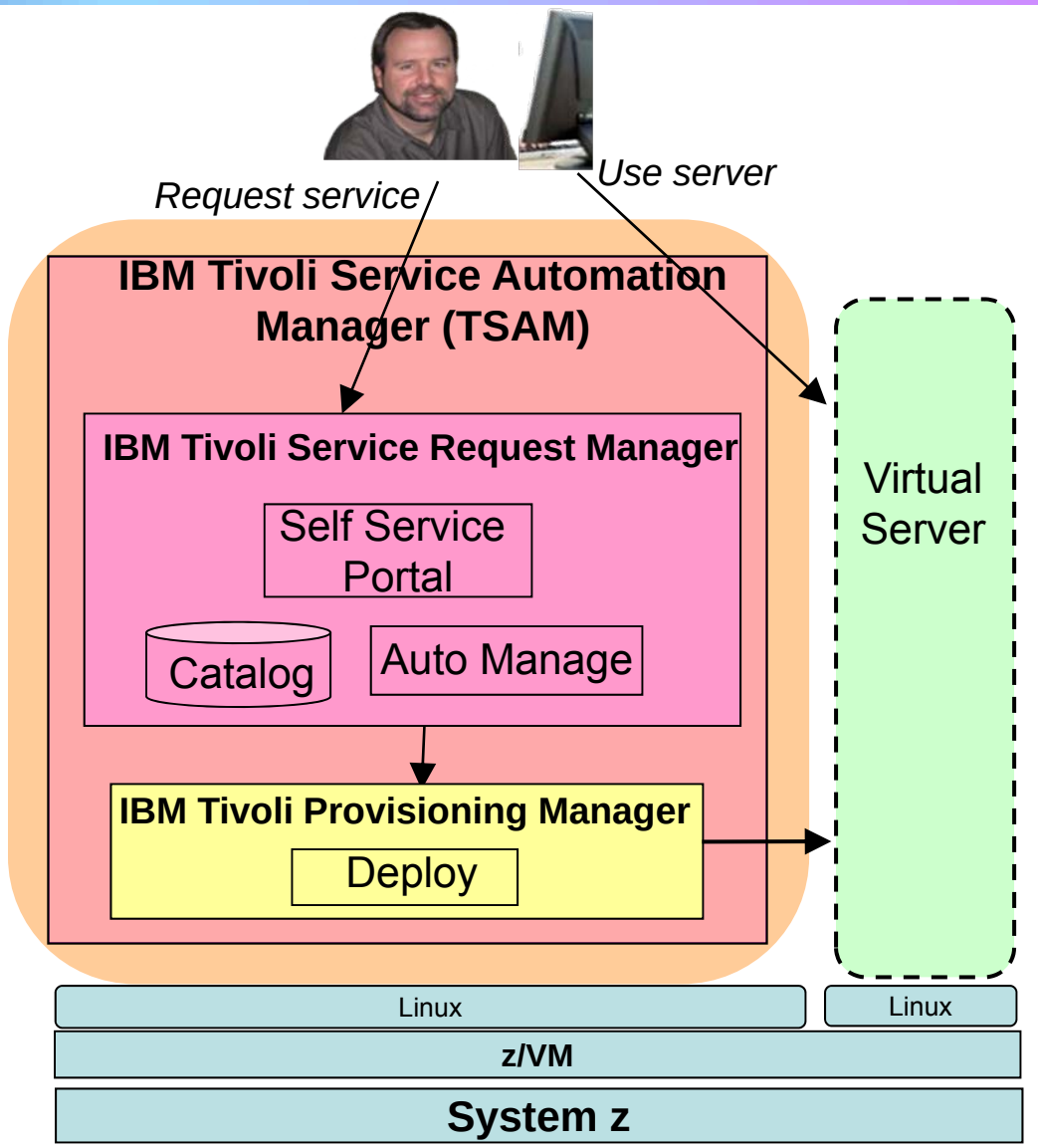


Tivoli Service Automation Manager (TSAM) Delivers Fast Self-Service Provisioning

- TSAM leverages two stable and mature Tivoli products to create a user friendly provisioning solution
  - **Tivoli Service Request Manager** provides the web-based interface with service desk and service catalog
  - **Tivoli Provisioning Manager** provides the automation infrastructure required to deploy new virtual servers
- TSAM self-service users can create, delete or modify a virtual server

Example – User Requests New Virtual Image On System z To Test Loan Application

1. Use browses through service catalog, adds service to his shopping cart, submits request
2. TSAM approves user request, reserves hostname
3. TSAM starts the deployment process via Tivoli Provisioning Manager workflow
4. TSAM notifies the user that the virtual server is ready



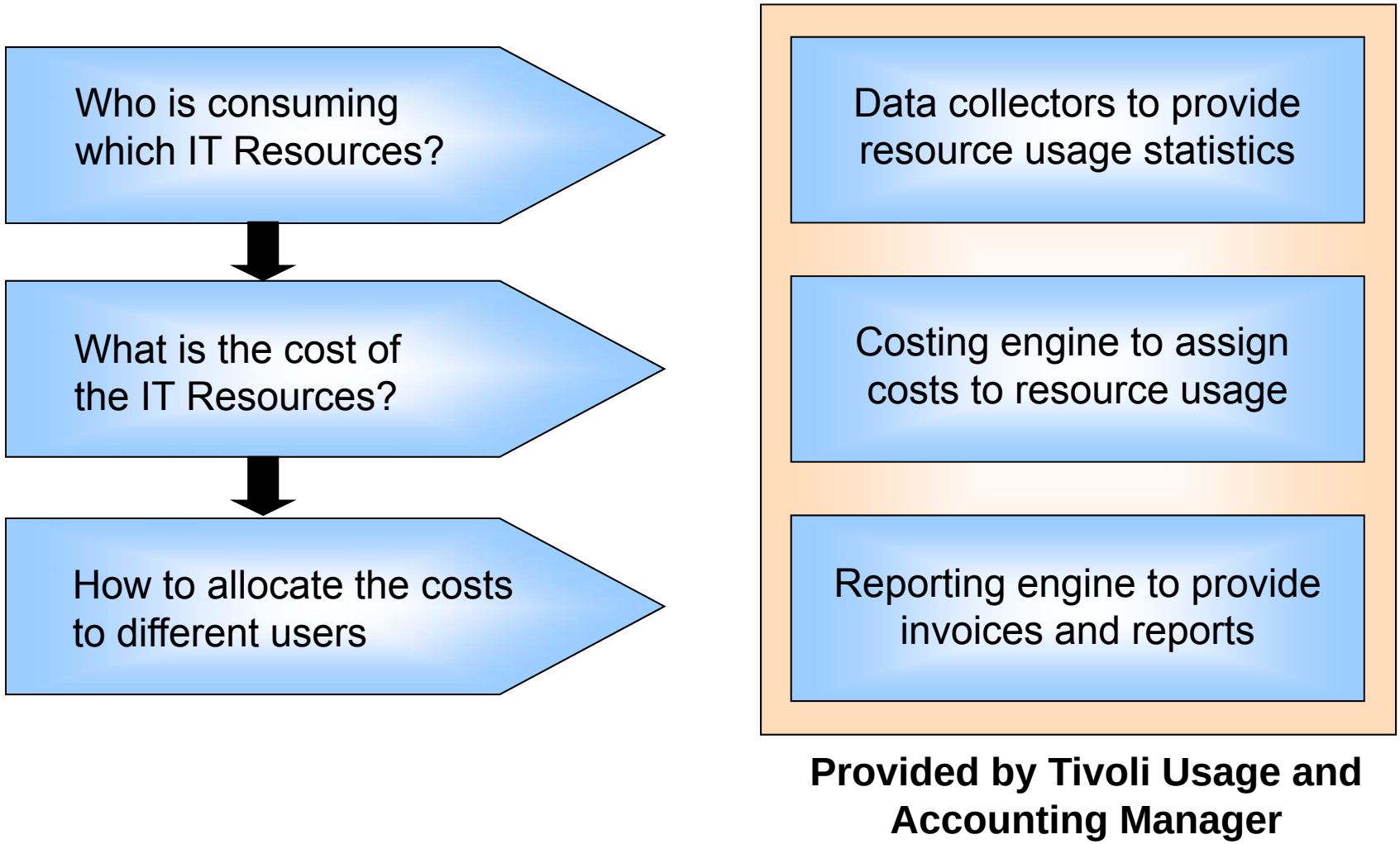
Respond Quickly By Provisioning With Tivoli Provisioning Manager

- 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

Monitor Consolidated System z Resources

- *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

Customers Pay for What They Use In A Private Cloud



Provided by Tivoli Usage and Accounting Manager

Tivoli Usage And Accounting Manager

- 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

Get Started with IBM System z Solution Edition for Cloud Computing

NEW

Software, OS and Hardware

- eyeOS V1.8.7
- Tivoli Service Automation Manager (TSAM) V7.2
- TSAM WAS component
- Tivoli OMEGAMON XE on z/VM and Linux
- z/VM
- Linux
- System z10 or IFLs
- Memory
- Storage

Services

- Deploy sample application image - eyeOS*, an open source application
- Planning workshop for cloud environment (pre-install)
- Install and configure Tivoli products / components
- Testing scenario development and execution for service automation and management
- Configure the system for the customer (LPAR creation, security configuration, etc.)
- Install / prepare the base z/VM environment

Package for cloud computing foundation that includes IBM System z hardware, Tivoli software and IBM services

National Business Center (NBC) Using System z for Cloud Computing

Customer benefits:

- **Faster ROI**
- **Self service access to mainframe assets**
- **Reduced operations and labor expenses**
- **Internet scale**
- **Rapid provisioning of workloads**
- **Enterprise qualities of service for cloud workloads**

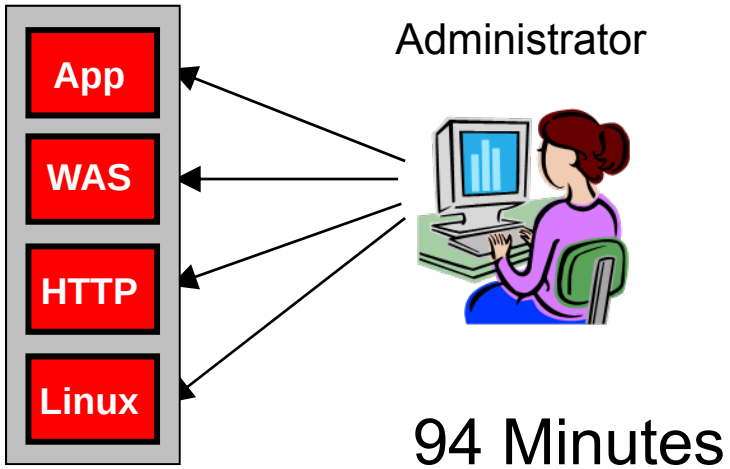
In the spotlight

"We are using System z to deliver cloud computing and hosting services while advancing our innovative business models.
Doug Bourgeois - Director, National Business Center

Learn more: *http://www.ibm.com/systems/z/solutions/editions/cloud/index.html*

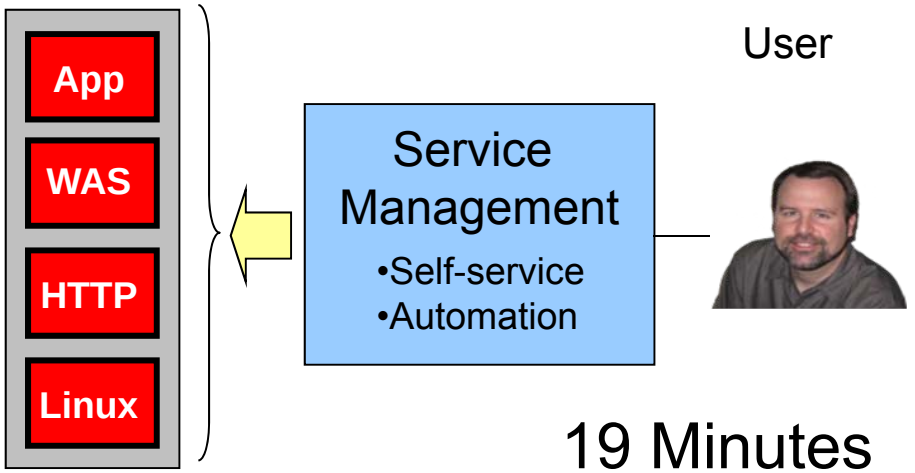
Deployment Study On The Labor Benefits Of Self-Service Provisioning and Automated Install

Manual Install



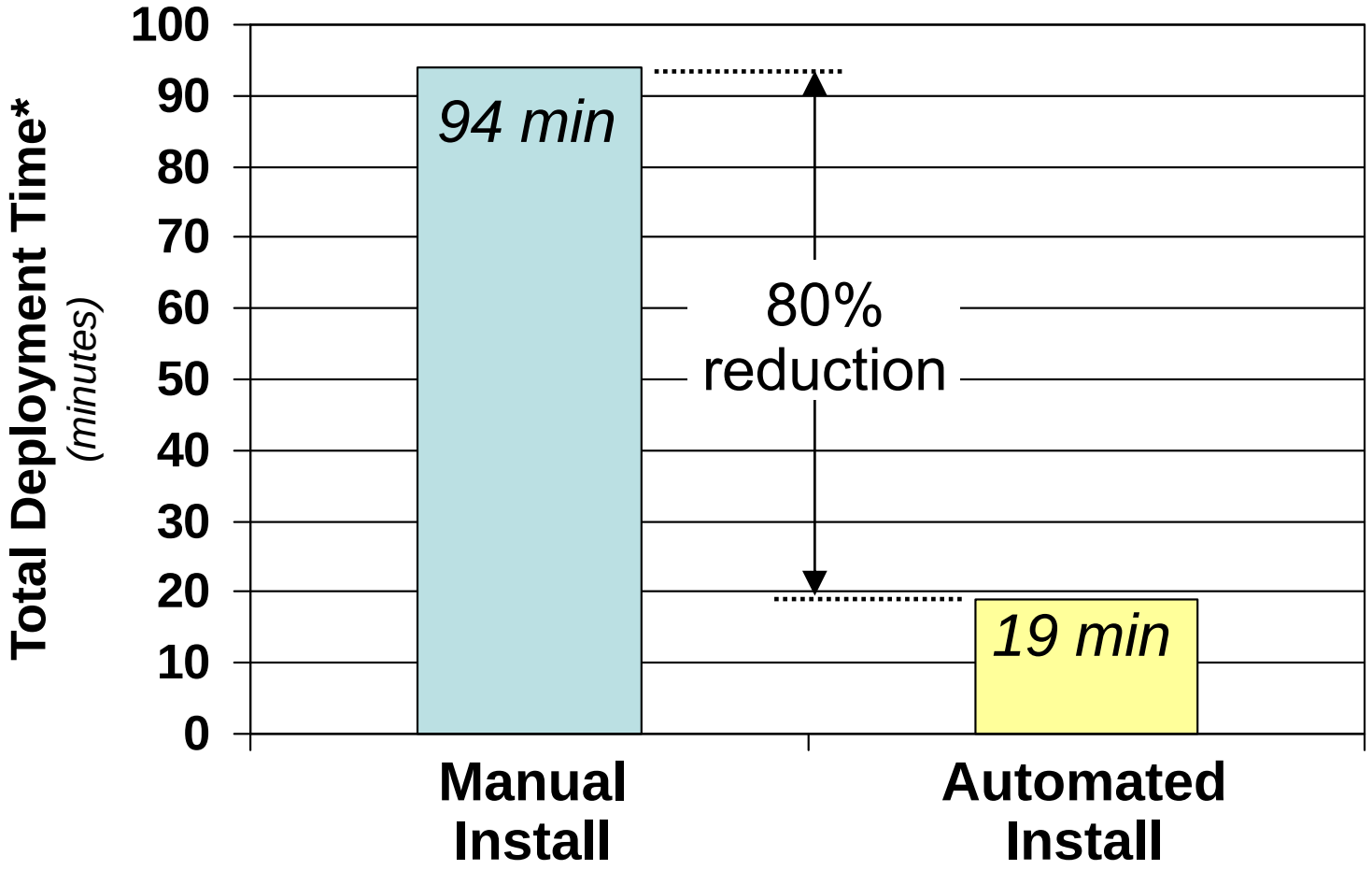
IBM eServer x365 Dual Core Intel Xeon3.0 GHz
12 GB Memory

Self-Service Provisioning and Automated Install



IBM eServer x365 Dual Core Intel Xeon3.0 GHz
12 GB Memory

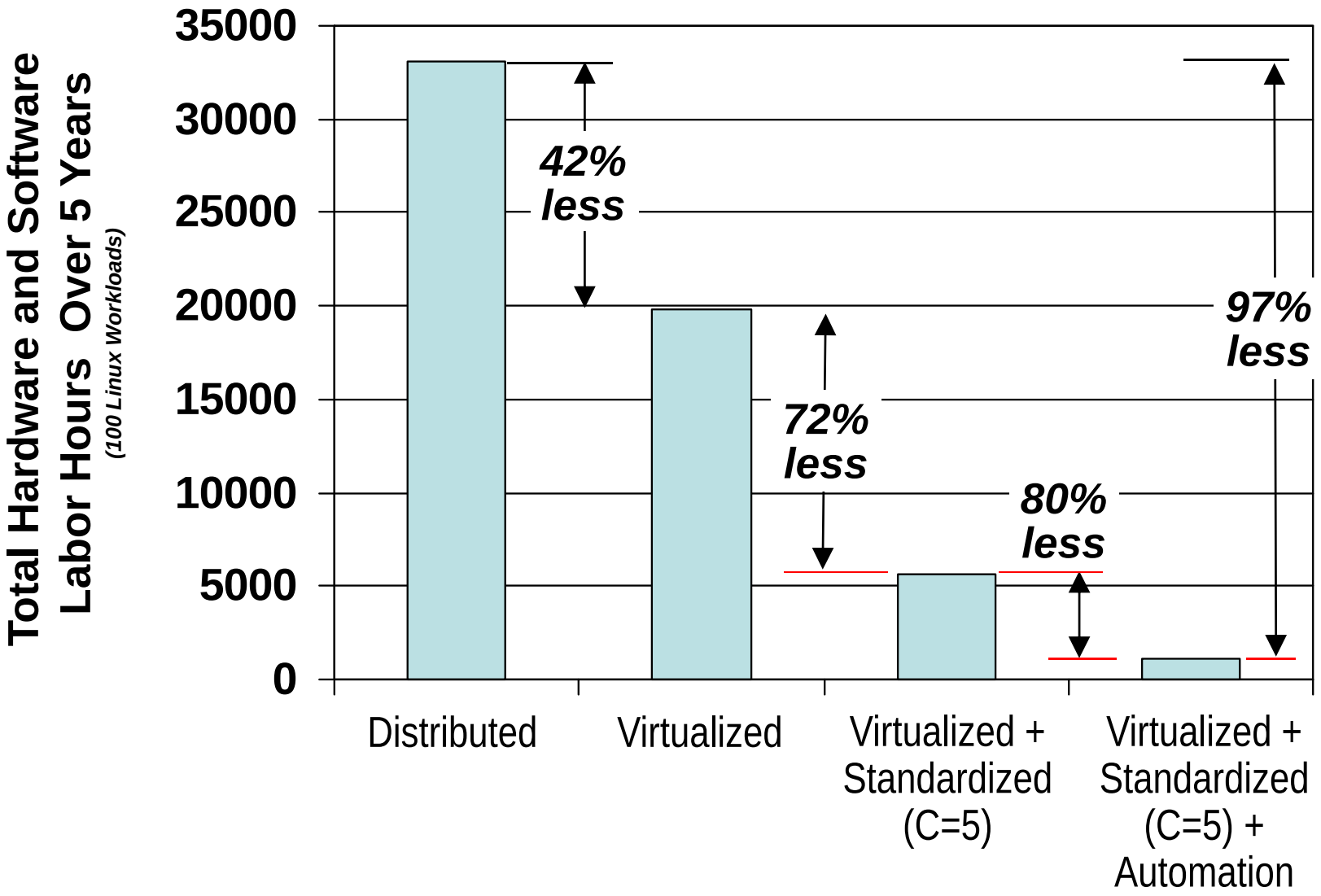
Benefit Of Automated, Self Provisioning On Labor Costs



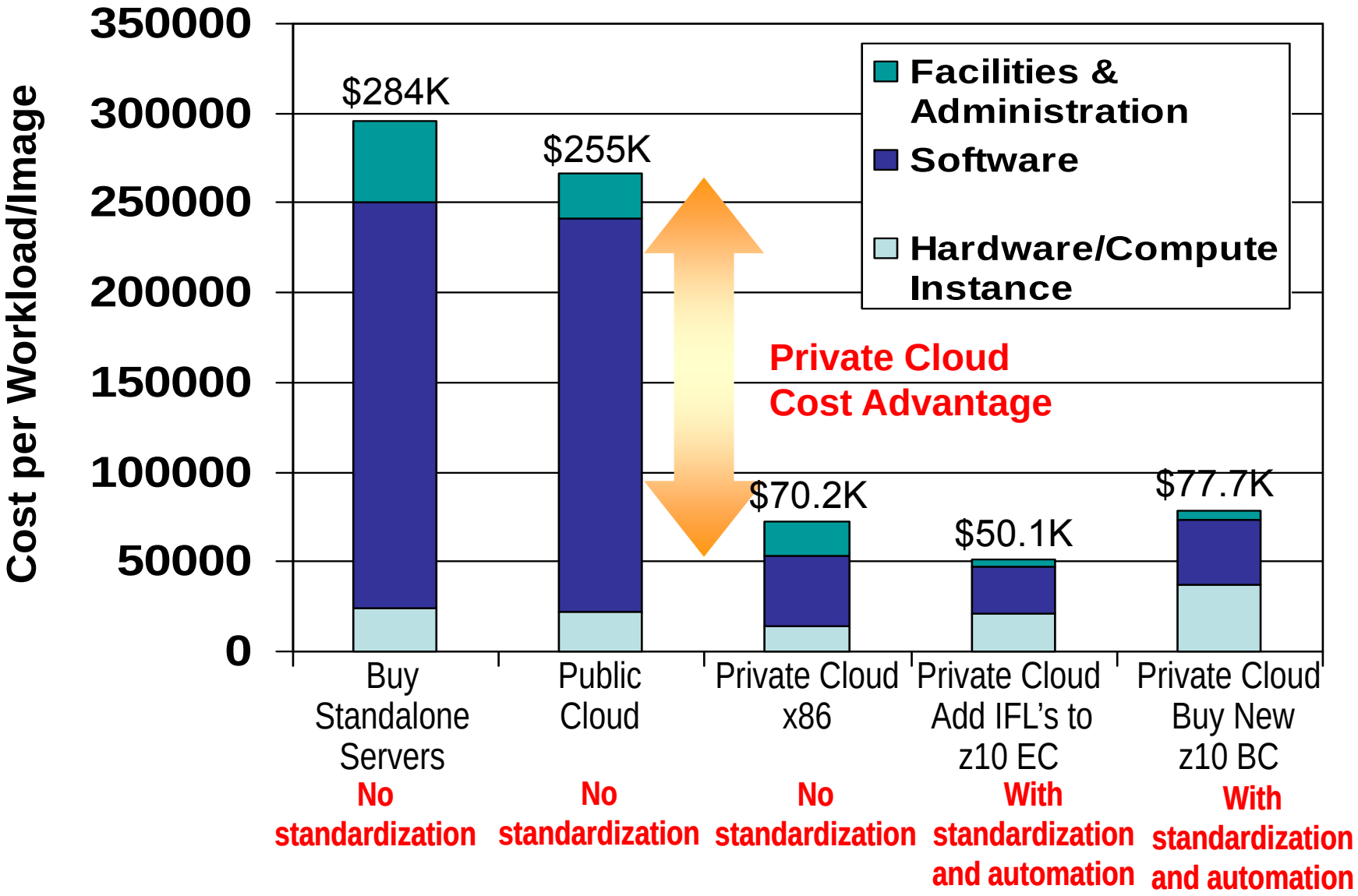
Applying this labor savings ratio reduces Software Labor (S) from 178 to 36 for each VM image!

* Excluding network transmission time

Total Hardware and Software Labor Costs for 100 Linux Workloads Over 5 Years



Let's Put It All Together In Our Example- Cost Per Image for Linux Workloads (5 Yr TCO)



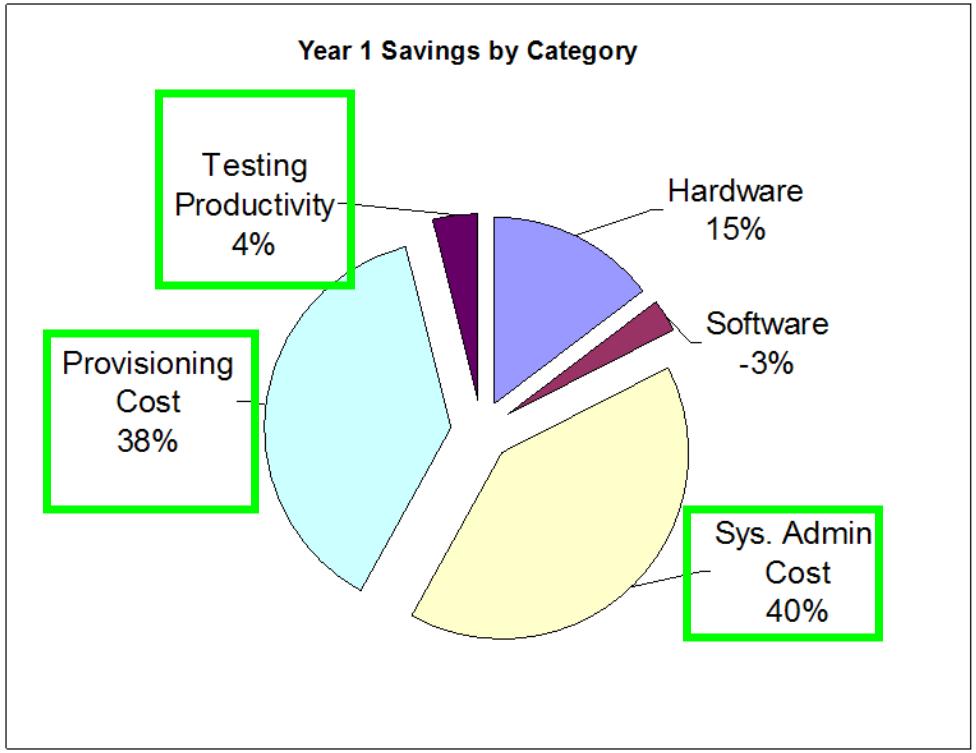
What About The Cost Of Converting?

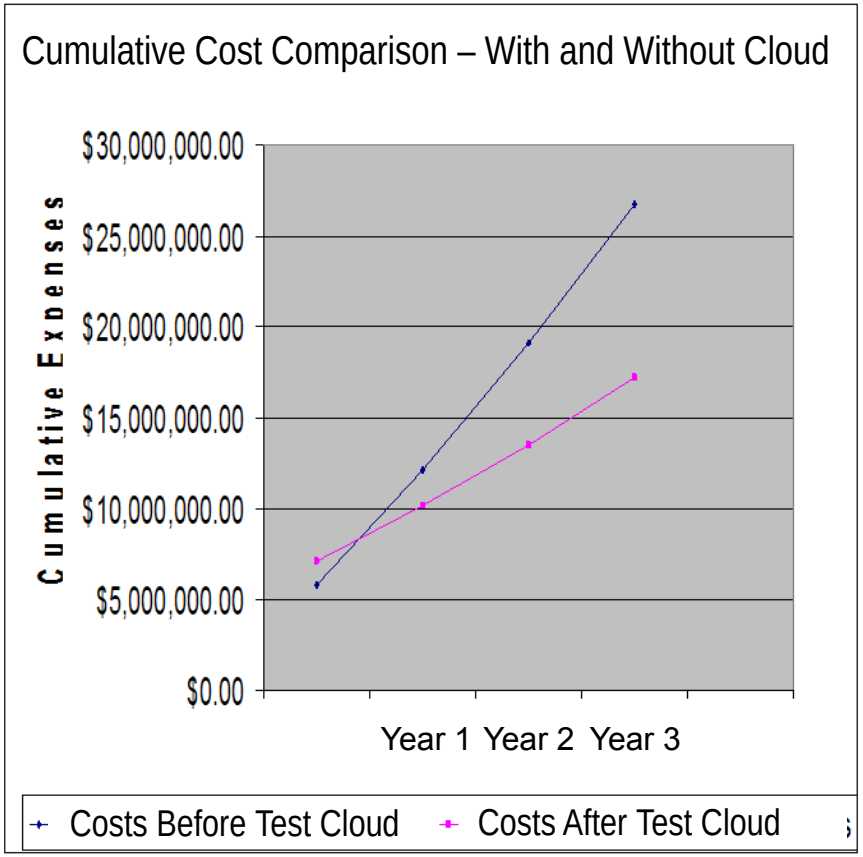
- IBM Research conducted a Cloud Computing ROI study of over a dozen companies in 2009
- Input taken directly from IBM clients as well as IBM Strategic Outsourcing (SO) teams
  - Existing customer environment
  - Projected cost savings through automation and self-service provisioning with service management
- Two customer examples:
  - Large environment - Banking (400 servers)
  - Small environment - Manufacturing (10 servers)

Let's take a closer look at the ROI…

Example –
Large Banking Private Cloud ROI Analysis

Payback Period (months)	4.85
Total Initial Investment for Test Cloud	$1,313,958.33
Net Present Value (NPV)	$6,172,325.64
Estimated ROI over 3 years	469.75%
Estimated avg. annual ROI	156.58%



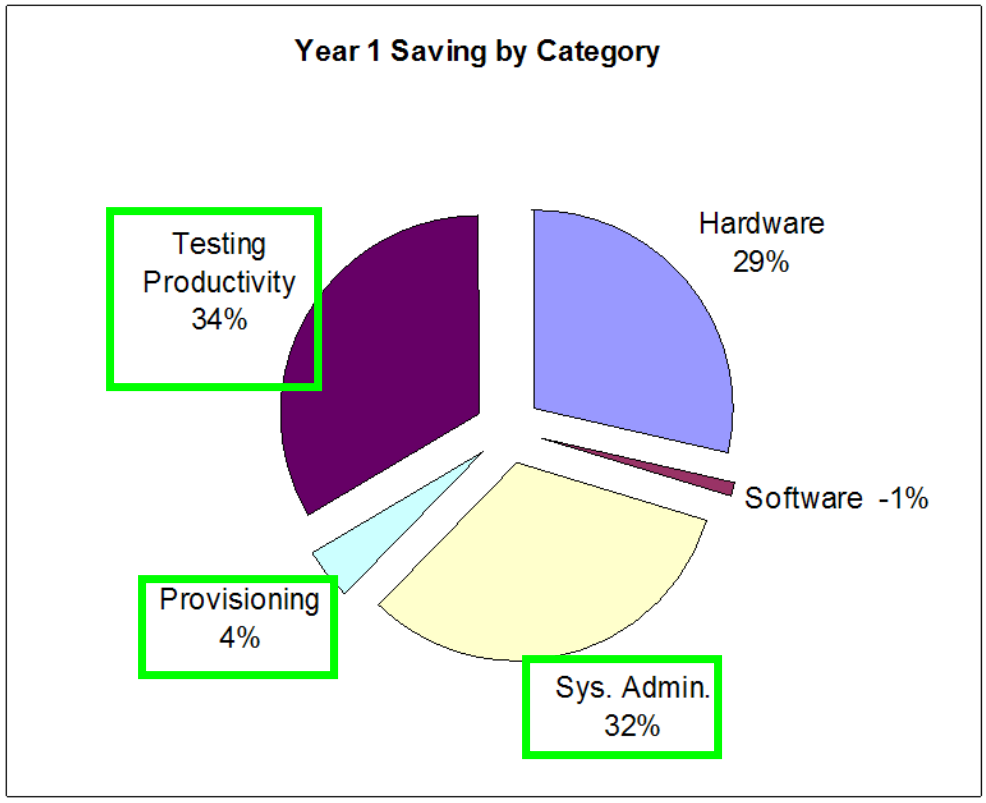


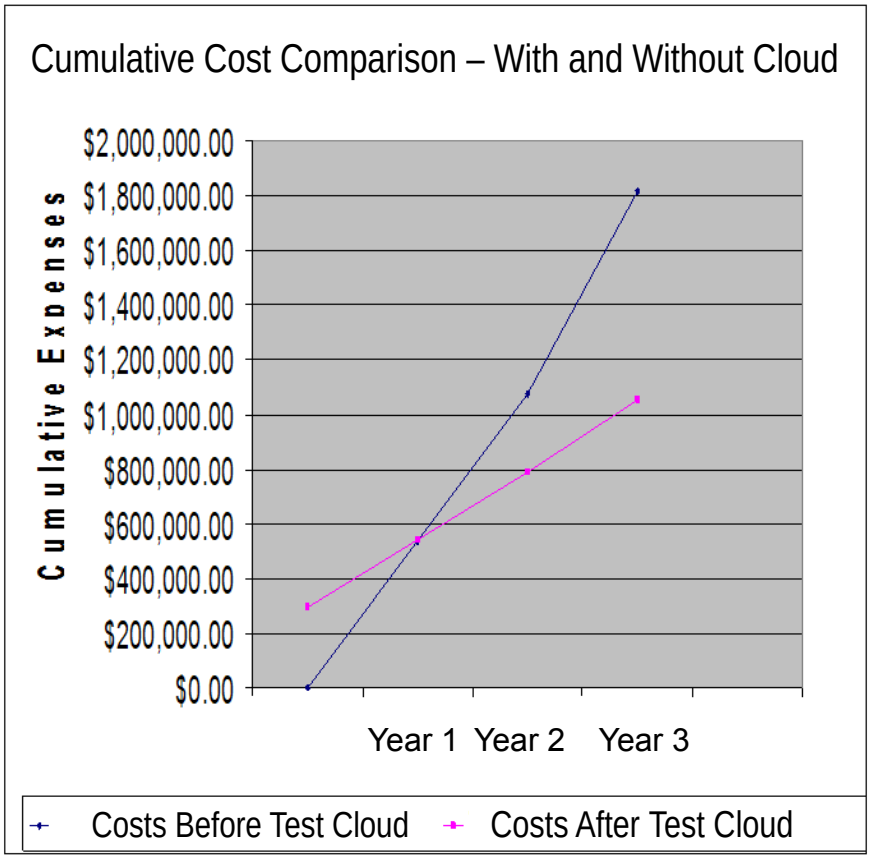
= Service Management driven savings

ROI projections from IBM Research Study 2009

Example-
Small Manufacturing Private Cloud ROI Analysis

Payback Period (months)	12.18
Total Initial Investment for Test Cloud	$294,583.33
Net Present Value (NPV)	$669,678.84
Estimated ROI over 3 years	227.33%
Estimated avg. annual ROI	75.78%





= Service Management driven savings

ROI projections from IBM Research Study 2009

Summary

- The most effective service management uses a combination of cost saving strategies to deliver private cloud services
  - Virtualization, Standardization, Automation
- System z is very cost competitive for Linux virtualization
- Standardization of software stacks enables more cloning which minimizes software labor costs
- Use of automation and self-service provisioning further drives down software labor costs per unique stack
- In our example, System z and the Tivoli Service Management Center offerings reduced the 5 year cost per image by 72%

Do You Understand *Your* Costs?

- What are your IT resources?

  (hardware, software, people, power, heating/cooling, floor space, etc..)
- What's their utilization? By whom?
- Does utilization, deployment align with business goals and direction?

Annual Operations Cost Per Server
(Averaged over 3917 Distributed Servers)

Power	$731
Floor Space	$987
Annual Server Maintenance	$777
Annual connectivity Maintenance	$213
Annual Disk Maintenance	$203
Annual Software support	$10,153
Annual Enterprise Network	$1,024
Annual Sysadmin	$20,359
Total Annual Costs	$34,447

The largest cost component was **labor** for administration
7.8 servers per headcount @ $159,800/yr/headcount

- If you don't know the correct allocations, it's difficult to improve efficiency and make TCO decisions

It's important to have solid IT Financial Management processes, procedures, and tools in place

Accurate Cost Allocations Show a Truer Picture of Costs and Aid Investment Decisions

- Best practice allocation is to use actual distributed and mainframe costs
- In this example, the mainframe allocation decreased from 71% to 40%

	Typical Allocation – Management Estimates				Best Practice Allocation – Actual Costs			
	Distributed	%	MF	%	Distributed	%	MF	%
Power Cost	0	0	$15,084	100	$11,917	79	$3,167	21
Labor Cost	0	0	$350,000	100	$210,000	60	$140,000	40
Floor space	0	0	$11,620	100	$6,300	54	$5,320	46
Software OTC depreciation	$120,240	60	$102,472	40	$216,194	97	$6518	3
Software S&S and MLC	$168,783	50	$168,783	50	$181,242	54	$156,325	46
Hardware OTC depreciation	$103,691	25	$311,074	75	$184,435	44	$230,330	56
Hardware Maintenance	$20,276	25	$60,829	75	$37,151	46	$43,953	54
Network	0	0	$4,758	100	$ 4,758	100	$0	0
Total	$412,990	29	$1,024,620	71	$851,997	60	$585,613	40

Sample monthly allocation

Total $1,437,610

Total $1,437,610

Interested?

- Learn more
  - on how to get more value out of your IT investments
  - about ITFM processes
  - if you may have gaps in your current ITFM processes

- Contact

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