System z Cost & Value

IT Optimisation and System z Cost/Value

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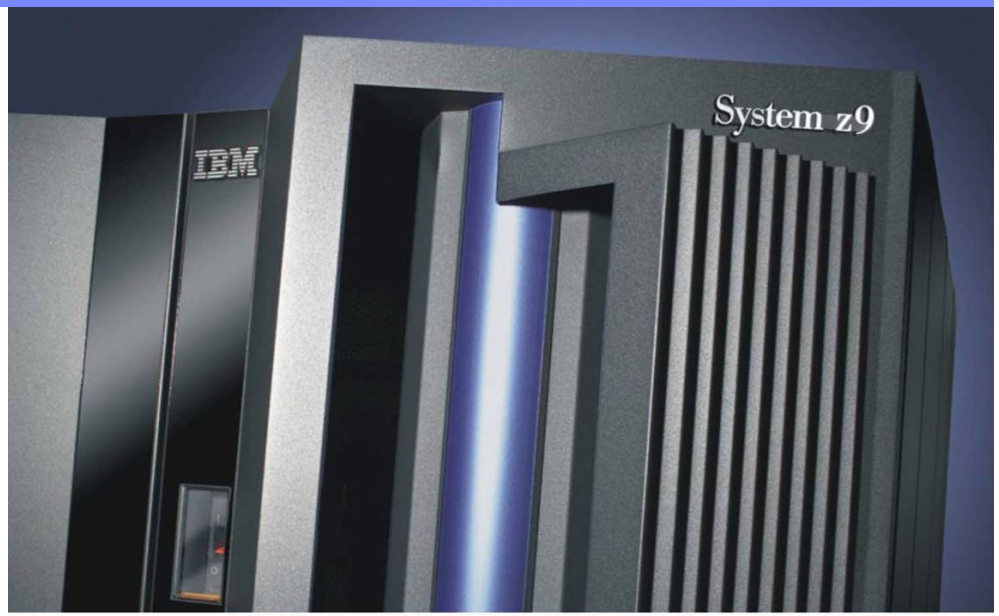
Large Systems Update
16th – 18th October 2007
Stockholm and Gothenburg

Agenda

- Overview of IT Optimisation, Costs and Value
- IBM Global Account Consolidation Project
- Customer Examples
  - Consolidation to zVM-Linux
  - New Applications on System z
  - CICS growth on z
  - Rehosting to UNIX
- Closing Thoughts

System z Cost & Value

Overview of IT Optimisation, Costs and Value



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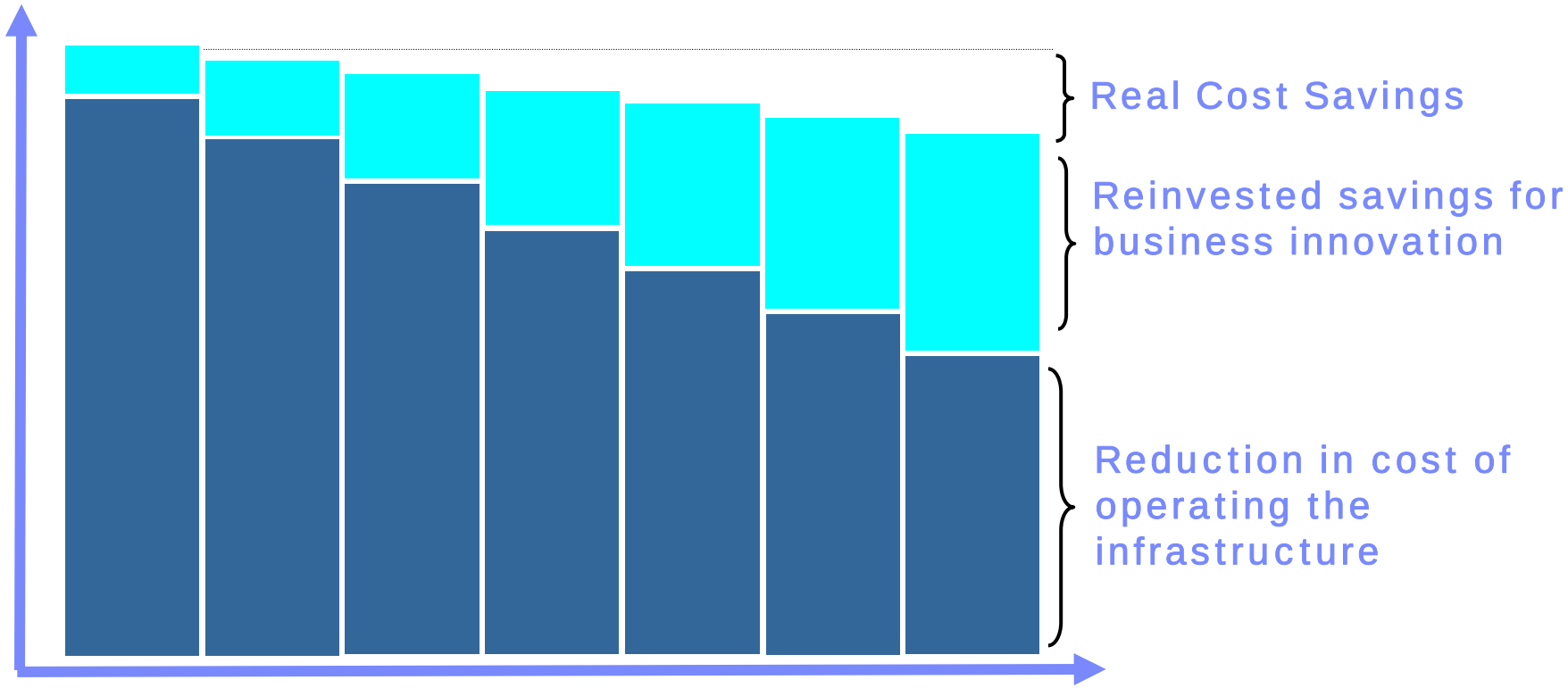
IT Rationalization for optimization and improved Costs

Today, businesses need to continually deliver efficiency gains to enable them to re-invest part of their savings in enabling business innovation



Example: Total IT Expense/Resource - by Technology Platform

>5000 UNIX & Windows servers, Mainframes, Tandem,...

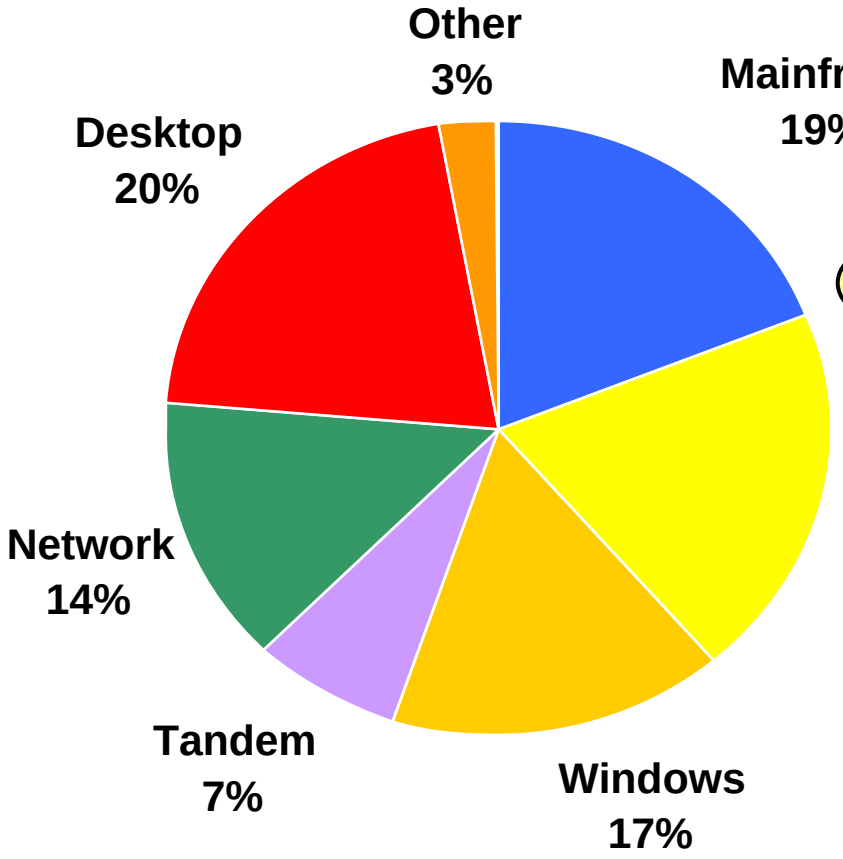
~3500 Inhouse FTEs, plus outsourcing of much service delivery

full banking service

~10 Mn customers
~40,000 employees
~1000 branches
4 major call centres
4000 ATMs

300 Mn ATM txns/yr.
4 Bn IMS txns/yr.

Total IT budget*
>1000 M$/yr.

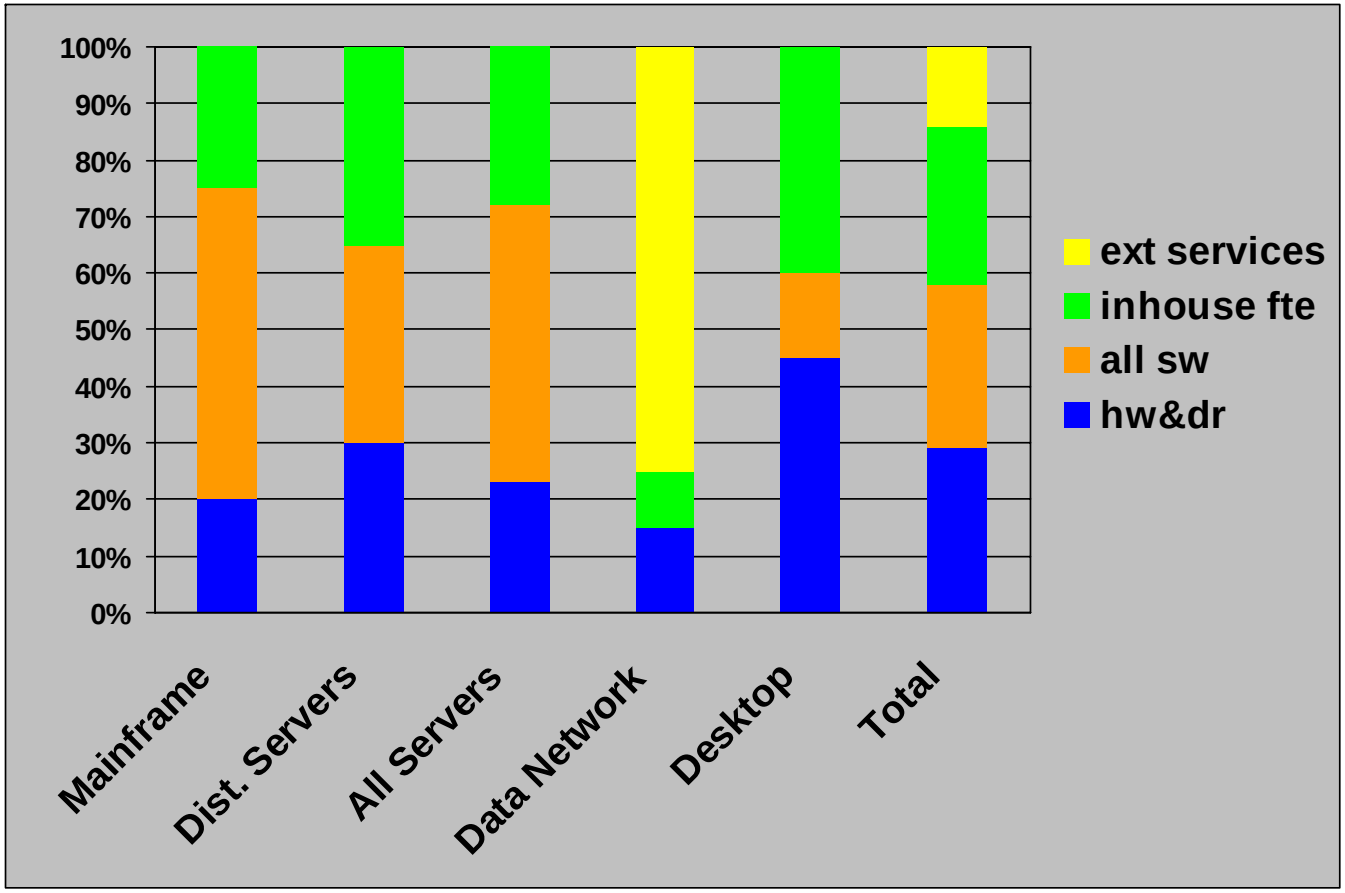


what IS the current IT cost profile? can you draw this pie-chart?

Mainframe Cost is typically in the range of 20-25% of the total IT Budget

* includes all hardware, software and people costs for service delivery, app. mtce and app. enhance/new projects

Example: Mainframe, Windows & UNIX Technology Cost Profiles



This is a real example.
Your mileage will vary a lot.

Overall IT breakdown into hardware, software people and services by type of technology.

Desktop support is the most people intensive, then distributed servers then mainframe

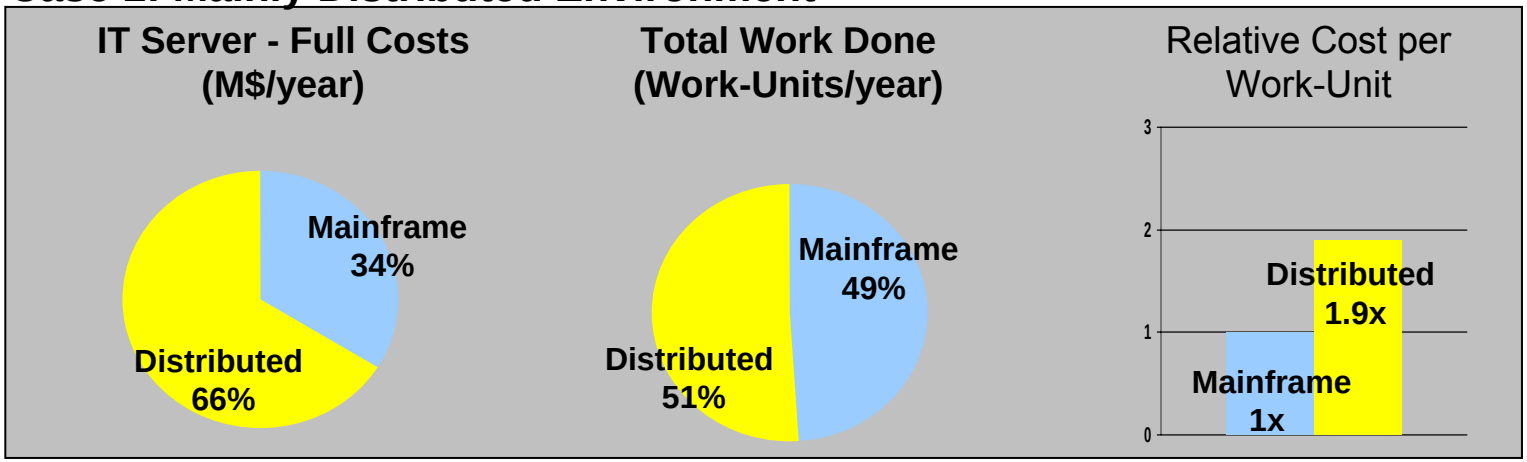
Software includes IBM, CA, Oracle, Microsoft…

Networks are mainly external services and a very different profile

Mainframe cost profile is typically dominated by IBM and ISV software (~50%)
UNIX and Windows servers are roughly equal in hardware, software, people.
People cost varies significantly by country or region

Total Server Infrastructure - Two Cases of Estimated Cost per Work Unit

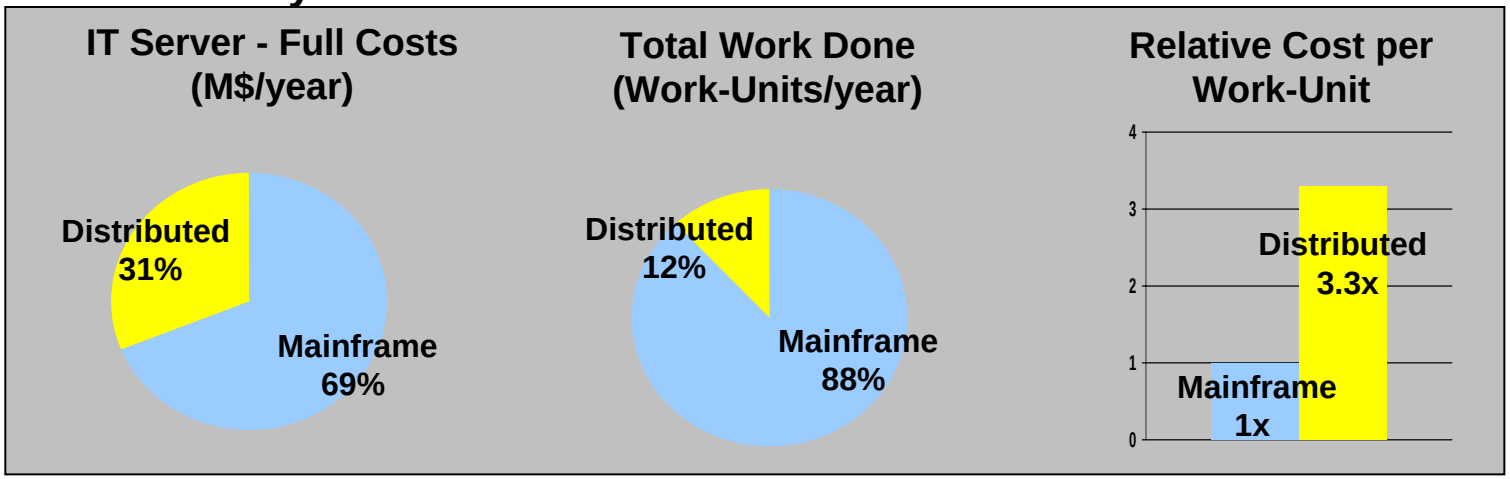
Case 1: Mainly Distributed Environment



case 1:
very large retail bank
total of service delivery plus application development

mainly UNIX distributed
(>5000 servers)

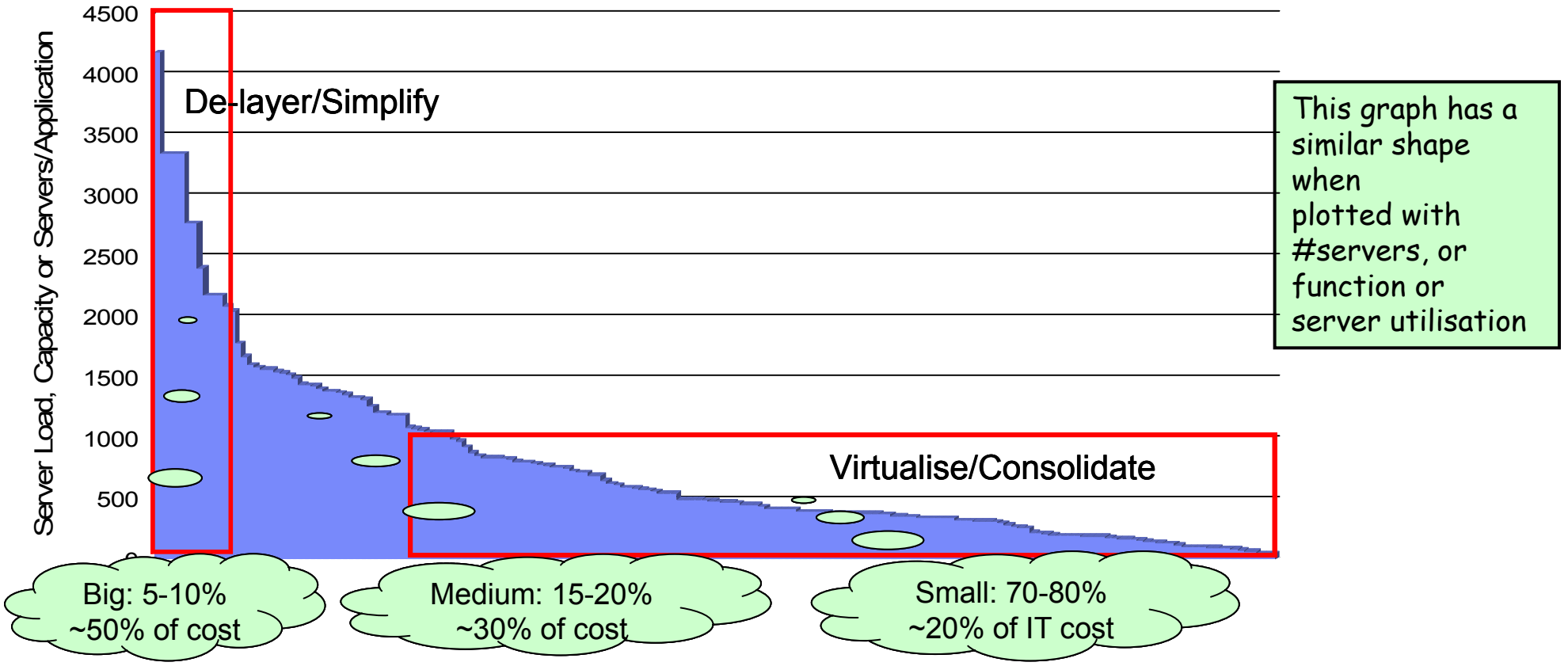
Case 2: Mainly Mainframe Environment



case 2
medium retail bank
service delivery only
mainly mainframe
2500 mips, 13 Mn txns/day
limited distributed servers
Windows + some UNIX
(~350 servers, 12% util'n)

The distributed IT Total Cost/Work-Unit is approx. 2-3 x Mainframe Cost/Work-Unit
The Mainframe typically does more work, Distributed has a lot of supporting infrastructure

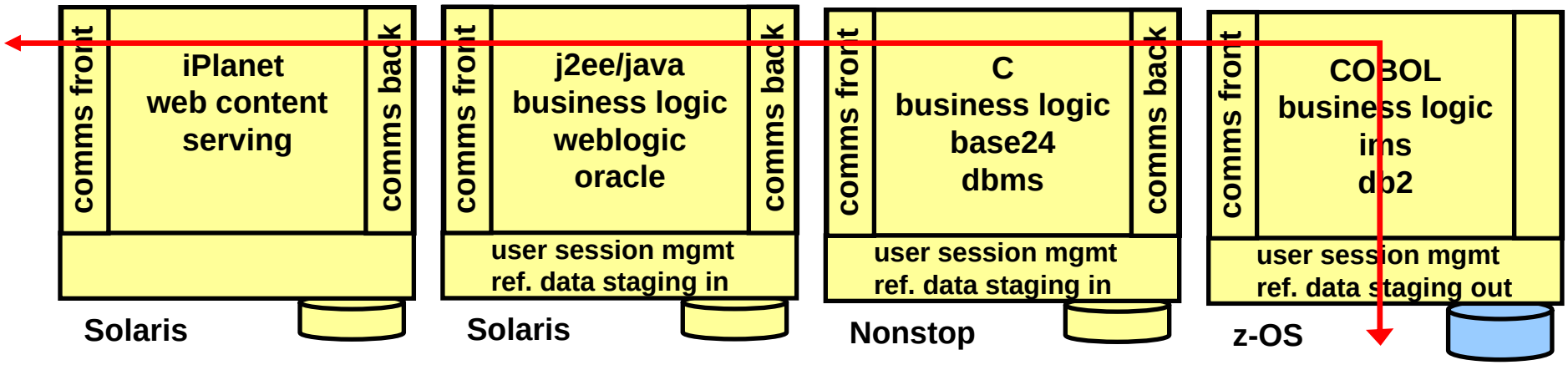
Distributed servers example: Three Types of 'Applications' – Big, Medium and Small



A very typical curve. The Three Areas for Analysis are 'Top 5-10%', 'Medium' & 'Others'
The key IT strategy for 'small' is virtualisation/consolidation; for 'large' it is de-layering

Example: 180 UNIX/Windows servers, 6% of the servers burned >60% of the load; 80% of the servers burned <20% of the load
Medium applications typically include SAP landscapes, BI/Data Warehouses, Exchange/Domino Services
Large applications include multi-tier branch/depot/store applications etc (large numbers of identical servers)

Example: A 'Top 10' Multi-tier Hybrid Server Application



This is an example of a '5-tier' branch teller application
Each server tier performs a different function
and talks with a 'thick client' desktop
Note that the master update is only performed once
Intermediate tiers only stage/cache data

Reducing the number of layers/tiers has a significant impact on cost
Design future integrated applications with the smallest possible number of tiers

Utilization of Distributed Servers

Provision for expected growth

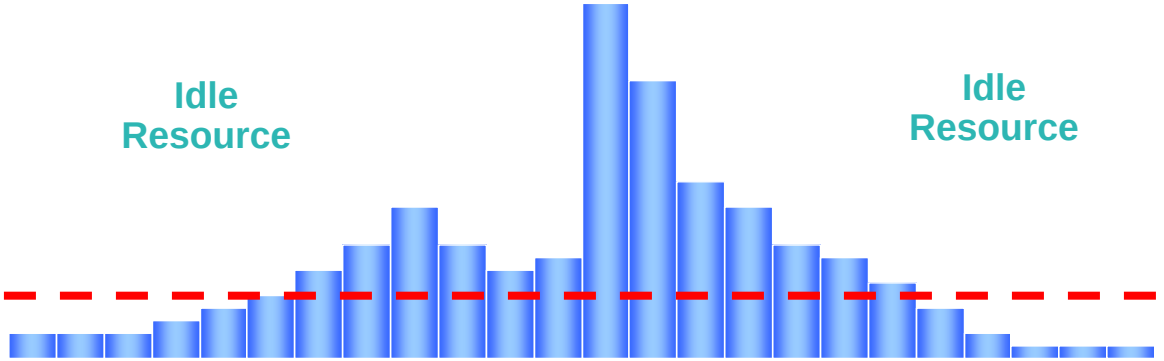
Idle Resource

Provision capacity for peak workload

Idle Resource

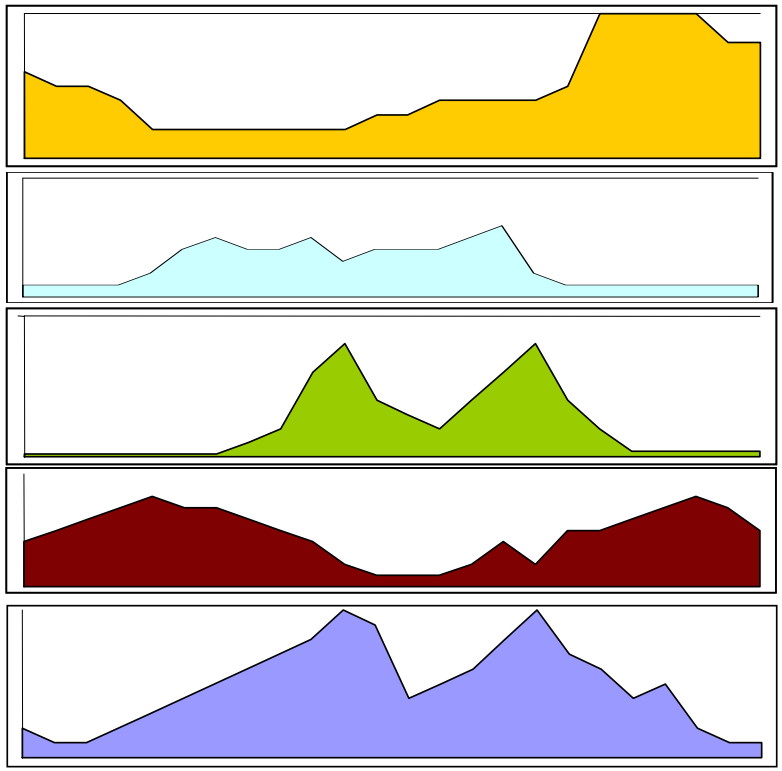
Idle Resource

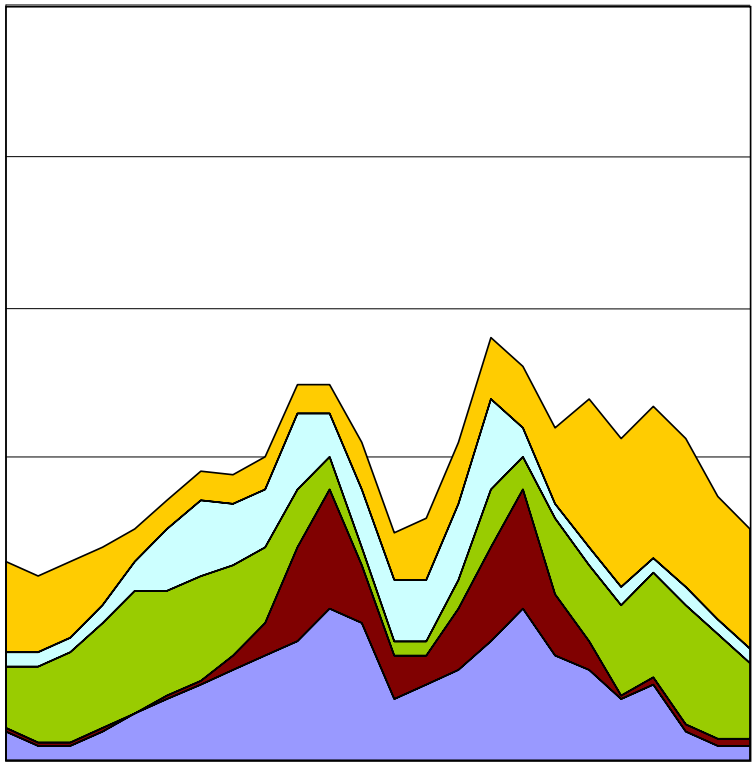
Average utilization



- Typical utilization of Windows Servers 5 – 10%
- Typical utilization of UNIX Servers 10 – 20%
- Typical utilization of System z Servers 85 – 100%

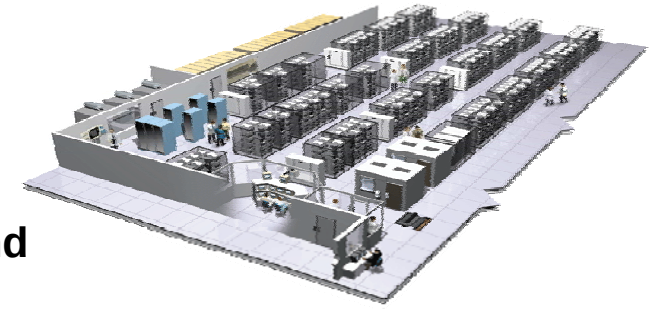
Resource Optimization via Virtualization & Sharing





Consolidating several separate physical servers with workloads with non overlapping utilization peaks allows better hardware resources utilization and better peak handling capabilities

The Advantages of System z Virtualization



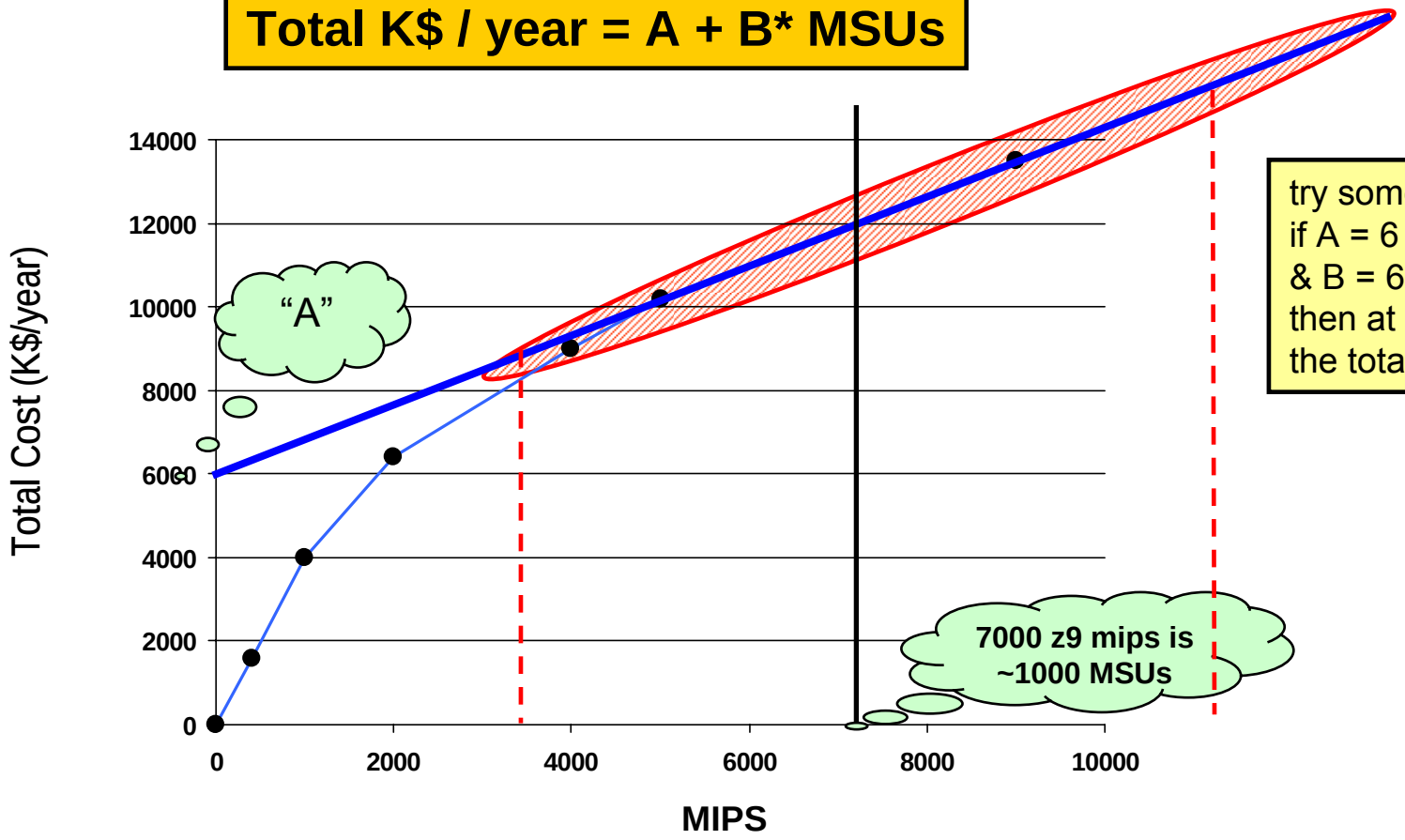
- **Replace many physical servers with virtual ones**
  - **Resources are shared for better utilization**
  - **Server resources are allocated dynamically, based on demand**
  - **Additional capacity is available to handle unpredictable fluctuations as well as planned increases**

Benefit from the capabilities enabled by virtualization…

- ***Cost savings*** **– reduced capital outlay and management expenses**
- ***Consolidation*** **– fewer servers doing more work**
- ***Greater utilization*** **– ability to handle increased workloads and multiple applications on a single machine**
- ***Standardization*** **– ability to apply standard management tools across a diverse work environment**
- ***Automation*** **– replacement of manual business processes and controls for infrastructure management**
- ***Integration*** **– increased collaboration across the enterprise for greater operating efficiencies and economies of scale**

Mainframe Total Cost (H/w, S/w, People) varies with System Size

Total K$ / year = A + B* MSUs

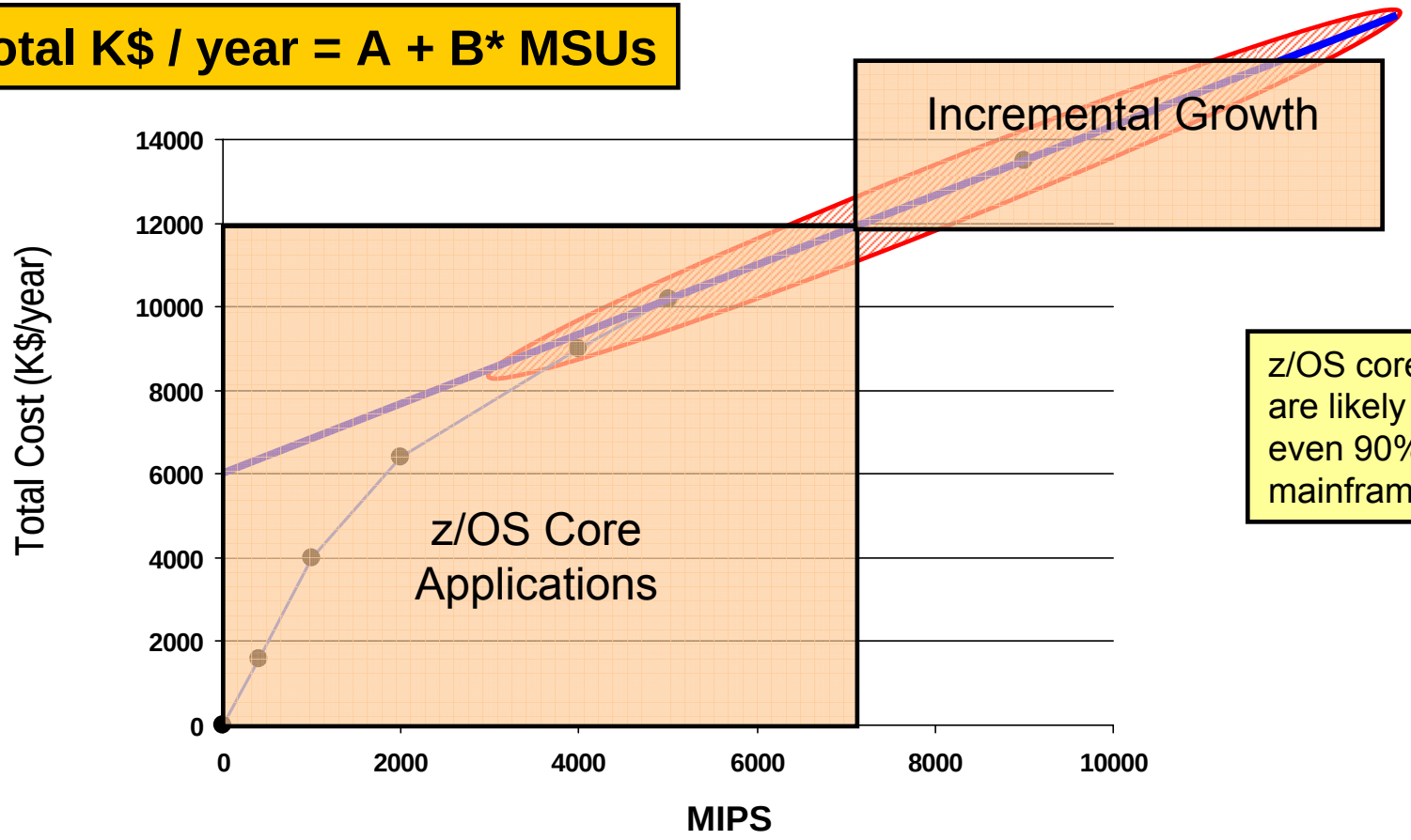


try some numbers:
if A = 6 M$/yr.
& B = 6 K$/yr./msu
then at 1000 msus
the total is 12 M$/yr.

notes: Typically a good straight-line fit over a wide range of values (eg: half to double MSU capacity)
'A' is usually a very large value – typically x.x Million $ / year. 'B' is much smaller and x.x K$/yr./msu.
Total cost includes hardware (acquisition. and maintenance), software (OTC and MLC) and people (FTEs).
The values of 'A' and 'B' depend heavily on the software stack, dominated by z/OS, CICS, MQ, DB2, Tivoli...
The total mainframe software cost (IBM & non-IBM) is usually very visible. 7000 z9 mips is ~1000 msus

Mainframe Cost Profile (H/w, S/w, People) drives all Business Cases

Total K$ / year = A + B* MSUs



z/OS core applications are likely to be 80%, or even 90%, of the total mainframe cost profile

If you double the core mainframe txns, what happens to the cost ? (typically +30 to 40%)
If you offload half the core txns, what happens to the cost? (typically minus15-20% at best)

Cost of Ownership is Key

Addressing the 'Hidden' Operational Costs of Computing

- **Downtime**
  - Cost of downtime can vary by industry and can range from hundreds of thousands to millions of dollars per hour

    ©Robert Francis Group. All Rights Reserved 2005
- **Security breaches**
  - *More Than 90% Of Companies Expose Sensitive Data*

    Reconnex Insider Threat Index August 2005
  - *Businesses Reluctant To Report Cyber Attacks*

    2005 CSI/FBI Computer Crime and Security Survey
  - *One In Four Identity-Theft Victims Never Fully Recover*

    Nationwide Mutual Insurance Co. Survey July 2005
  - *Card Associations Unite Setting Standards to Fight Fraud*

    Green Sheet Inc. August 2005 Issue 2
- **Management and administration**
  - '*However, the costs of supporting and managing these complex environments and infrastructures have soared, and now far outweigh the customer's expenditure on new systems themselves*'

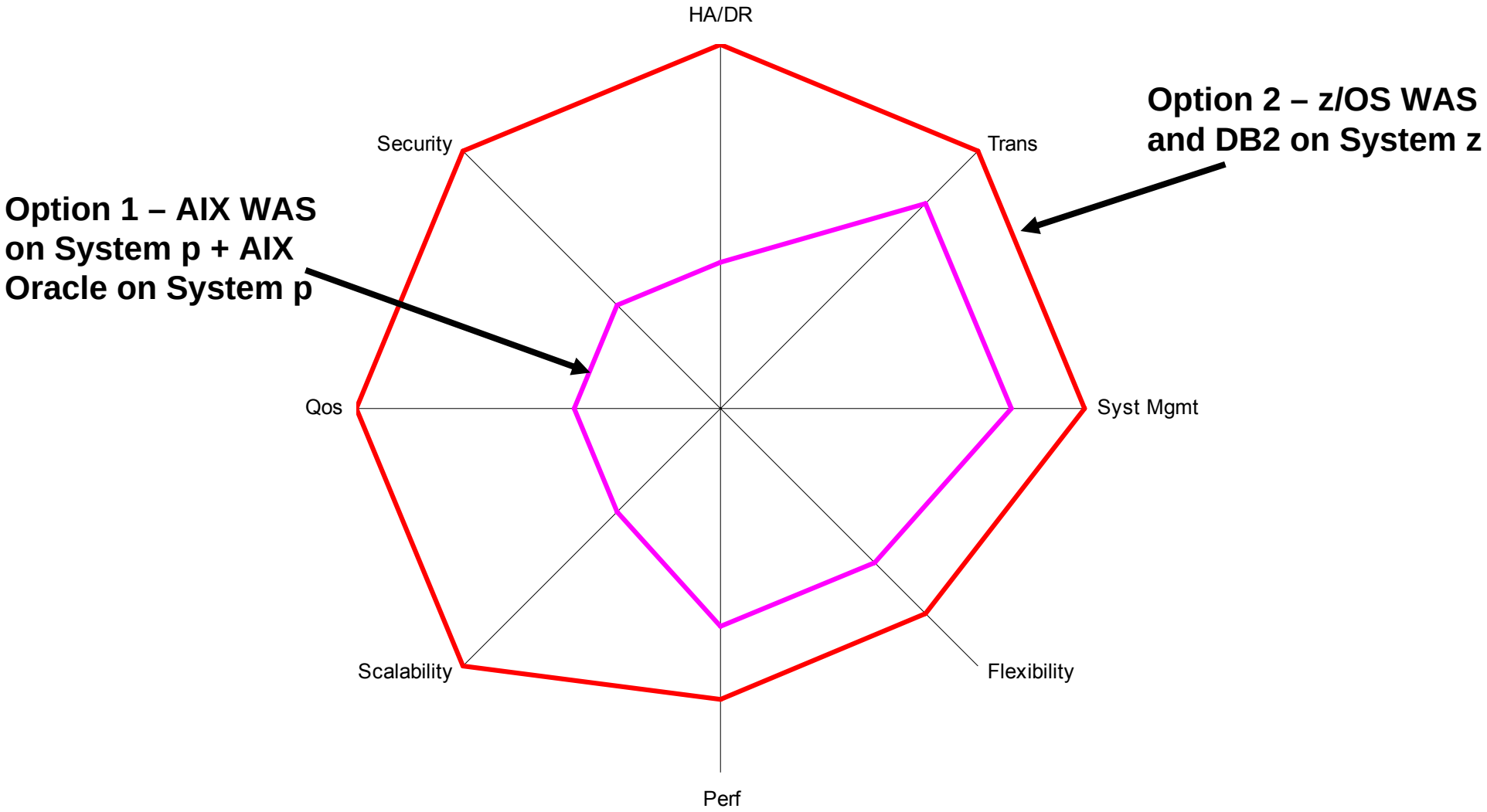
    © Software Strategies 2005 11

IBM Mainframe solutions are highly available, highly secure and highly managed to help lower Infrastructure costs

A full range of costs factors considerations – often ignored

- **Availability**
  - High availability
  - Hours of operation
- **Backup / Restore / Site Recovery**
  - Backup & Restore
  - Disaster Scenario
  - Effort for Complete Site Recovery
  - SAN effort
- **Infrastructure Cost**
  - Space, Power, Cooling
  - Network Infrastructure
  - Storage Infrastructure
- **Additional development and implementation**
  - Investment for one platform – reproduction for others
- **Controlling and Accounting**
  - Analyzing the systems
  - Cost
- **Operations Effort**
  - Monitoring, Operating
  - Problem Determination
  - Server Management Tools
  - Integrated Server Management – Enterprise Wide
- **Security**
  - Authentication / Authorization
  - User Administration
  - Data Security
  - Server and OS Security
  - RACF vs. other solutions
- **Deployment and Support**
  - System Programming
    - Keeping consistent OS and SW Level
    - Database Effort
  - Middleware
    - SW Maintenance
    - SW Distribution (across firewall)
  - Application
    - Technology Upgrade
    - System Release change without interrupts
- **Resource Utilization and Performance**
  - Mixed Workload / Batch
  - Resource Sharing
    - shared nothing vs. shared everything
  - Parallel Sysplex vs. Other Concepts
  - Response Time
  - Performance Management
  - Peak handling / scalability
- **Operating Concept**
  - Development of an operating procedure
  - Feasibility of the developed procedure
  - Automation
- **Integration**
  - Integrated Functionality vs. Functionality to be implemented (possibly with 3rd party tools)
  - Balanced System
  - Integration of / into Standards
- **Further Availability Aspects**
  - Planned & Unplanned outages
  - Automated Take Over
  - Uninterrupted Take Over (especially for DB)
  - Workload Management across physical borders
  - Business continuity
  - Availability effects for other applications / projects
  - End User Service, End User Productivity
  - Virtualization
- **Skills and Resources**
  - Personnel Education
  - Availability of Resources

Non-functional requirements – Radar diagram

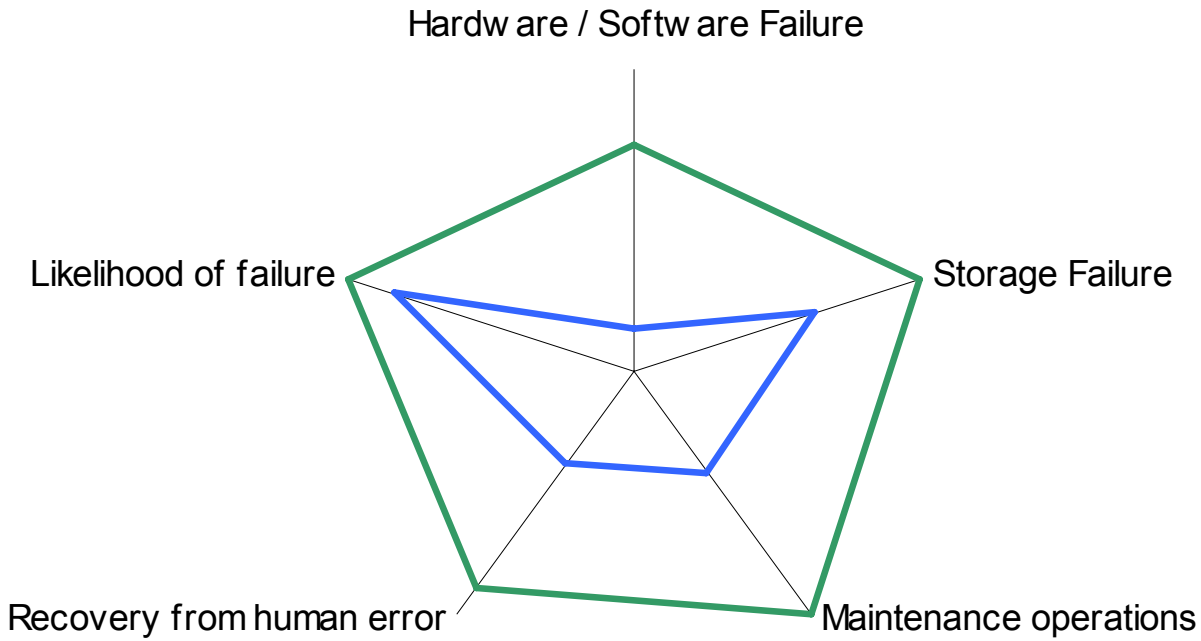


Source: IBM EMEA Products & Solutions Support Center, Montpellier

The value of DB2 for z/OS

- **High Availability and Disaster Recovery (HA/DR)**
  - Parallel Sysplex DB2 Data Sharing availability much better than on DB2 UDB on AIX (see radar chart)
  - Very fast and automated recoveries to any point in time
  - DB2 online utilities
  - WMQ highly available on z/OS through the shared queuing capabilities in a Sysplex environment
  - GDPS / Hyperswap & GDPS (0 data lost for Disaster Recovery)
- **Transactionality**
  - DB2 and z/OS integration supports (Two phase commit on z/OS using RRS)
- **System Management**
  - Superior, policy based disk and tape management (virtualization over the external storage resources)
  - Dynamic Workload management: z/OS WLM exploitation by DB2 enables consolidating workloads with different Service Level Agreements (SLA)
  - Hardware Data compression (less storage, faster Backups and Batch Performance)
- **Flexibility**
  - Virtual Networks / Hipersockets
  - Less Routers and Switches needed
- **Performance & Scalability**
  - Excellent scalability of DB2 data sharing
  - Virtual Networks / Hipersockets performance
  - Hardware Data compression (for batch and backup activities)
- **Quality of service (QoS)**
  - DB2 and z/OS integration supports (Two phase commit on z/OS using RRS)
  - Automated DB2 recoveries to any point in time
- **Security**
  - z/OS Security Server (RACF) and DB2 internal authorization and security mechanisms (Multi-Level Security)
  - Data Encryption using cryptographic features

Database Availability Comparison



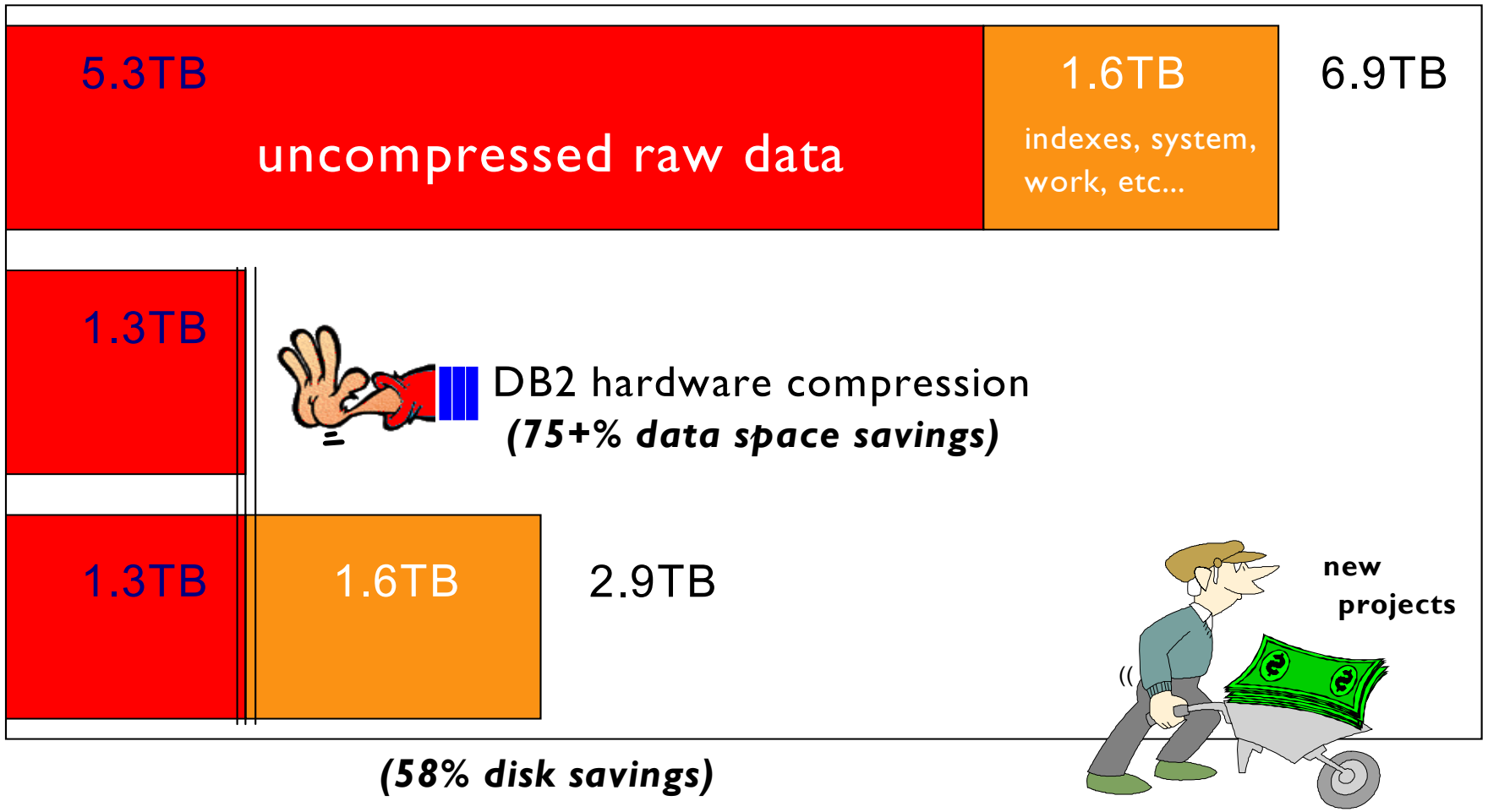
DB2 on z/OS — DB2 UDB on AIX

Source: IBM

DB2 for z/OS Data Compression efficiency

Note: DB2 v9 for z/OS includes compression of Indexes

Source: IBM Benchmark



Customers are realizing ……
"that the per transaction cost is really very modest"

Kevin Campbell, Chief Application Architect, Univar USA

Mainframe Costs

The cost of running incremental workload on the mainframe goes down as the total workload grows

- **Labour costs hold steady as workload grows**
- **Mainframe design & pricing favor the addition of more workload**
- **Highly Efficient Power and Cooling – Small Footprint**
- **Lower software costs per transaction as workload grows – and PRA can lower ISV tool costs**
- **High Availability and Security Translate into low cost**

Customers have learned that mainframes deliver economies of scale, especially as the workload grows

Distributed Costs

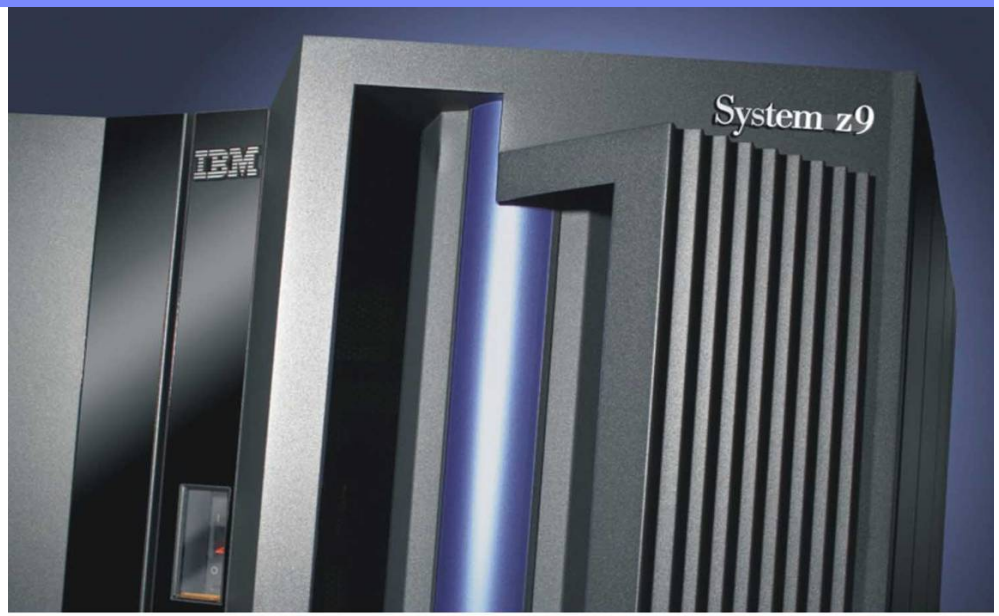
The cost of running additional workload on distributed servers goes up more linearly

- **Labour is now the highest cost element in distributed environments**
  Administrative staff costs increase in proportion to the number of servers
- **New workload requires additional servers and licenses**
- **Energy and Space cost is more linear**
- **Cost of software licenses is more linear**
- **Fractionally less Availability and Security can drive Significant downstream costs**

Result – scale out strategies do not deliver equivalent economies of scale as the workload grows

System z Cost & Value

IBM Global Account Consolidation Project



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IBM Consolidation Announcement Highlights

- ***IBM will consolidate 3900 servers onto approximately 30 System z mainframes***
- ***We expect substantial savings in multiple dimensions: energy, software and system support costs***
- ***Major proof point of IBM's 'Project Big Green' initiative***
- ***The consolidated environment will use 80% less energy***
- ***This transformation is enabled by the System z's sophisticated virtualization capability***

IBM'S PROJECT BIG GREEN SPURS GLOBAL SHIFT TO LINUX ON MAINFRAME

Plan to shrink 3,900 computer servers to about 30 mainframes targets 80 percent energy reduction over five years

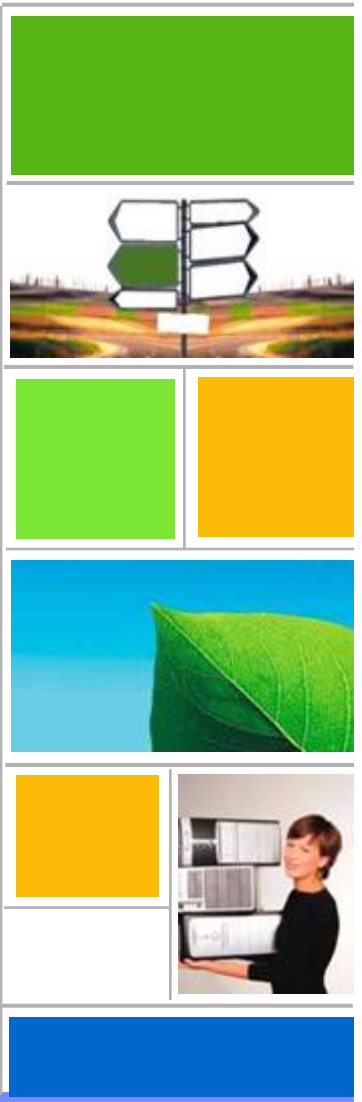
Optimized environment to increase business flexibility

ARMONK, NY, August 1, 2007 – In one of the most significant transformations of its worldwide data centers in a generation, IBM (NYSE: IBM) today announced that it will consolidate about 3,900 computer servers onto about 30 System z mainframes running the Linux operating system. The company anticipates that the new server environment will consume approximately 80 percent less energy than the current set up and expects significant savings over five years in energy, software and system support costs.

At the same time, the transformation will make IBM's IT infrastructure more flexible to evolving business needs. The initiative is part of Project Big Green, a broad commitment that IBM announced in May to sharply reduce data center energy consumption for IBM and its clients.

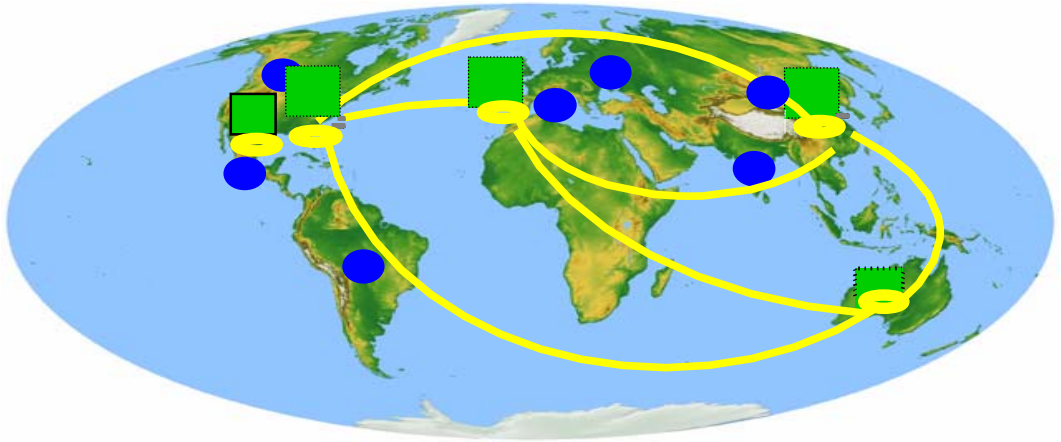
Project 'Big Green'

- IBM to reallocate $1 billion each year:
  - To accelerate "green" technologies and services
  - To offer a roadmap for clients to address the IT energy crisis while leveraging IBM hardware, software, services, research, and financing teams
  - To create a global "green" team of almost 1,000 energy efficiency specialists from across IBM
- Re-affirming a long standing commitment at IBM:
  - Energy conservation efforts from 1990 – 2005 have resulted in a 40% reduction in CO_2 emissions and a quarter billion dollars of energy savings
  - Annually invest $100M in infrastructure to support remanufacturing and recycling best practices
  - *Will double compute capacity by 2010 without increasing power consumption or carbon footprint saving 5 billion kilowatt hours per year*
- What "green" solutions can mean for clients:
  - For the typical 25,000 square foot data center that spends $2.6 million in power annually, energy costs can be cut in half
  - Equals the reduction of emissions from taking 1,300 automobiles off of the road



IBM's Transformation: An Ongoing Journey over 10+ years

IBM Strategic Delivery Model



Global Resources
Strategic IGA location
Strategic Web location for IGA
Ethernet and Power9 Networks

TECHNOLOGY

IBM Metrics	1997	Today
CIOs	128	1
Host data centers	155	7
Web hosting centers	80	5
Network	31	1
Applications	15,000	4,700

Tactical and operational efficiencies

- Consolidation of infrastructure
- Application consolidation/reduction
- Global resource deployment
- Enterprise end-to-end architecture optimization

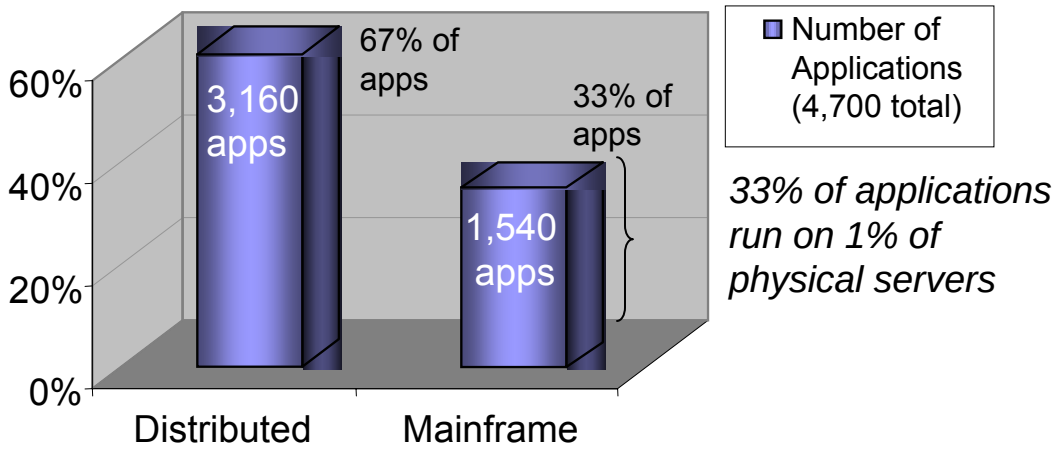
Continued server growth brought growing physical space challenges

Infrastructure Challenges

- **Floor space challenges in key facilities**
- **Underutilized assets maintaining outdated Web infrastructure**
- **Additional physical space needed for future SO growth**
- **Continued infrastructure cost pressure**

Distributed server consolidation is the next step in cost savings after the massive consolidation of IGS Data Centers

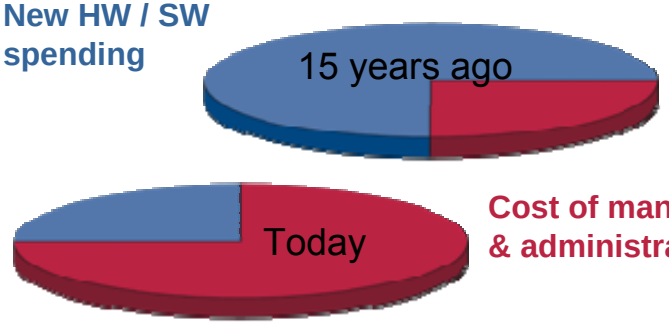
Application Distribution between Mainframe and Distributed Servers



33% of applications run on 1% of physical servers

Why System z Now?

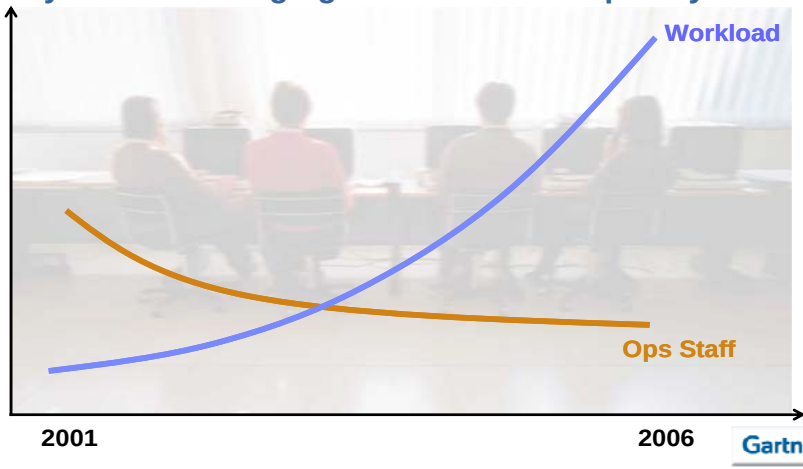
New HW / SW spending



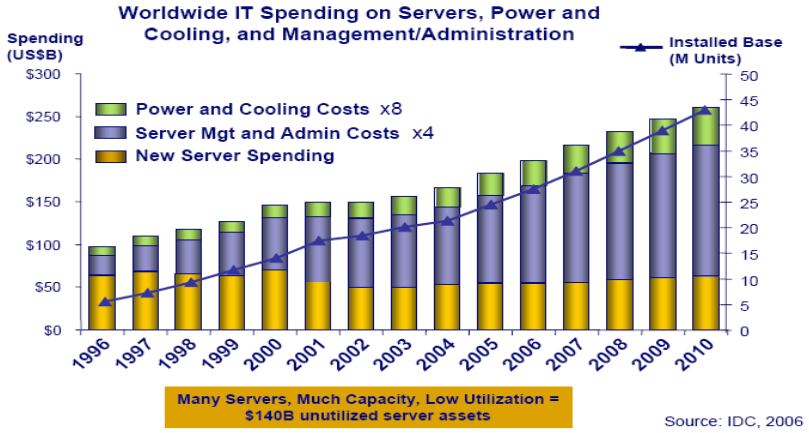
Cost of management & administration

Source: Tony Picardi, IDC
Economist.com: Make it simple. October 28th, 2004
From The Economist print edition

System z9 Managing Growth and Complexity

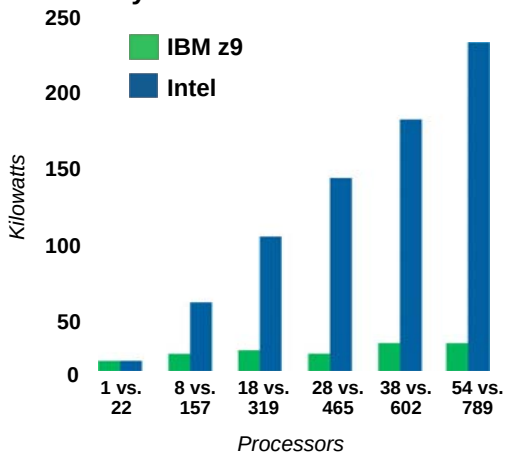


Worldwide Server Market:
Cost of Management Ramps Dramatically

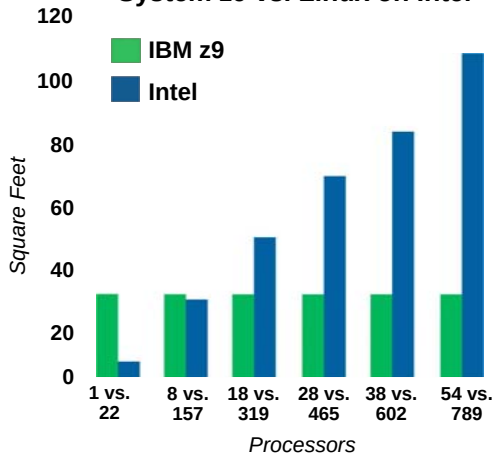


Source: IDC, 2006

POWER:
System z9 vs. Linux on Intel



SPACE:
System z9 vs. Linux on Intel



The Linux on Intel servers selected in this example are functionally eligible servers considered for consolidation to a System z running at low utilization such that the composite utilization is approximately 5%. The utilization rate assumed for System z EC is 90%. This is for illustration only actual power and space reductions, if any, will vary according to the actual servers selected for consolidation.

IBM identified 3,900 OS images for potential consolidation on System z

Approach

1. Enlisted Linda Sanford, Sr VP, Enterprise On Demand Transformation & Information Technology, as Executive Champion at enterprise level
2. Included scope of 8,600 images eligible for migration to find 3900 'fit for purpose' and with costs savings
3. Used commercial costs model to estimate savings
4. Holistic approach taken, including System p™ virtualization for appropriate work, application portfolio reduction, asset optimization
5. Selected workload that runs on multi-platforms for ease of migration – focus on transactional based workload

Initial Priority for consolidation to Linux on System z

DB2

Lotus

WebSphere

SAP

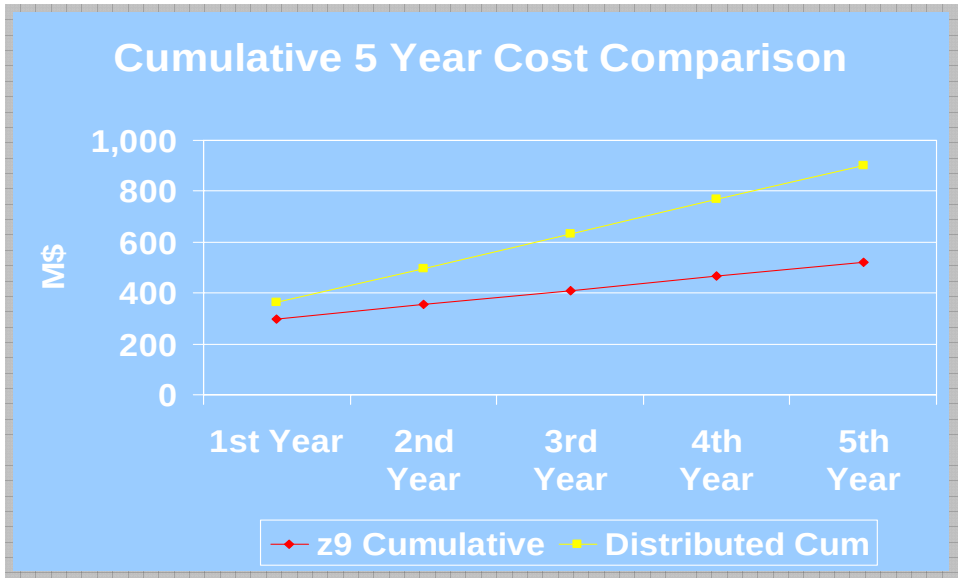
An integrated approach is underway to optimize the deployment plan

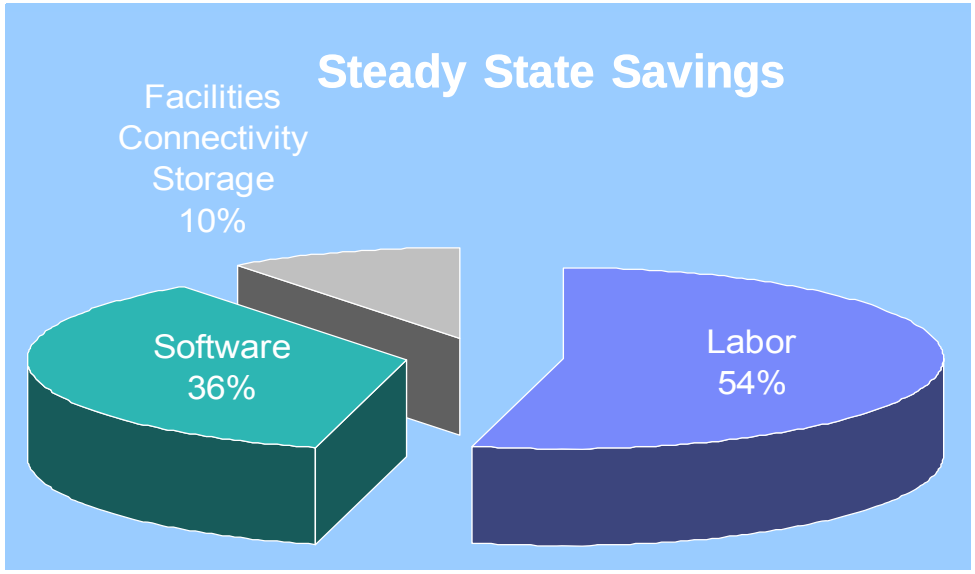
Elements from several approaches are being optimized

- **Migrate servers delivering largest savings first (i.e., stranded infrastructure)**
- **Eliminate assets with lowest utilization first**
- **Identify assets with an upcoming compelling event to mitigate expense (upgrade, move, asset refresh)**
- **Aggregate by customer work portfolio to leverage strong customer buy-in**
- **Start with oldest technology first**
- **Focus on freeing up contiguous raised floor space**
- **Provision new applications to the mainframe**

IBM Distributed Consolidation to System z

- **Performed costs and consolidation assessment on IBM portfolio**
  - **Cross-IBM effort: System z, SW Migration Services, Migration Factory**
  - **Analysis considers today's environment vs. "to be" environment; savings is net after hardware and migration investments**



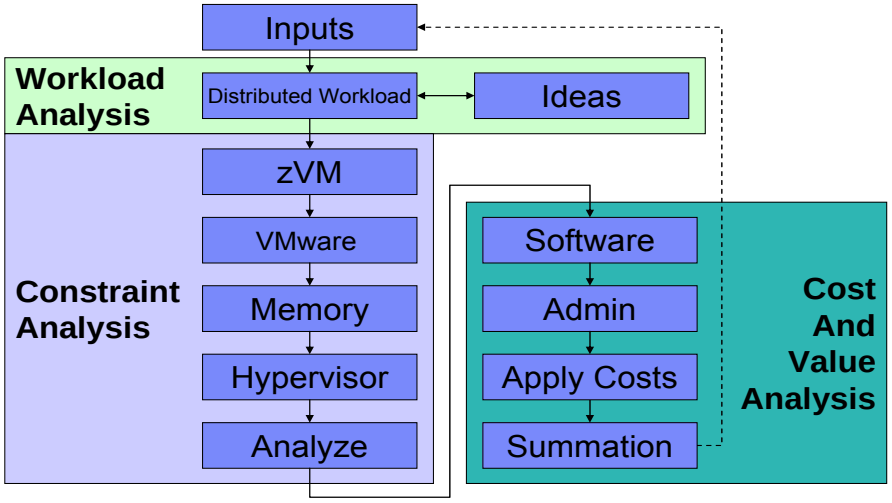


- **Identified 40+% savings opportunity – Estimated $250M over 5 years**
  - **Annual Energy Usage reduced by 80%**
  - **Total floor space reduced by 85%**

zRACE model provides budget and planning information through a structured set of questions

Relevant data provides a costing exercise for each “case”:

Case 0 – No virtualization (i.e. leave “as is”)
Case 1 – Linux for System z on z/VM
Case 2 – Linux on x86 with VMware



Cost and Value Components

- **Power and Cooling**
- **Floor Space**
- **Facilities**
- **Server Acquisition**
- **Connectivity Acquisition**
- **Disk Acquisition Analysis**
- **Server Maintenance**
- **Connectivity Maintenance**
- **Disk Storage Maintenance**
- **Software License**
- **Software Support**
- **Enterprise Network**
- **Admin**

Critical Success Factors

- **Sponsor needs to have an enterprise view**
  - **Complete costs/value assessment identifies full benefit to the corporation (broader than IT or TCA views)**
  - **Sponsor assists in managing execution of corporate level plan (versus application by application**
- **Strategic investment will be required for migration**
  - **Funding (may be out of cycle)**
  - **Training and System z resource deployment**
- **Clear goals, dedicated team, inclusive leadership is needed to execute the migration**
  - **Define the strategy for a holistic solution**
  - **Manage with an integrated, collaborative approach to help people overcome preconceived mindsets and become open to change**
- **Leveraging talent and capability across all of IBM driving rapid results**
  - **Integrating talent from Hardware division, Software unit and Services while sharing information between the IBM Global Account, strategic outsourcing and commercial accounts demonstrated the value intrinsic in the IBM Corporation**

This is a cornerstone initiative in the IBM quality of service imperative

- Leverages maturity of System z stack products for robust high availability
- Reduces complexity and increases stability
- Centralizes service level process management
- Potential for faster provisioning speed (months → days)
- Provides dynamic allocation of compute power
  - **Capacity on demand; increase/reduce compute power**
- Provides world class security

The Server Lifecycle – Where people time can be saved

- Acquire - Hardware
  - Sizing
  - Configuring
  - Physical Planning
  - Price Negotiation
  - Contract Negotiation
  - Contract Approval
  - Contract Administration
  - Installation Planning
  - Shipping and Receiving
- Acquire - Software
  - Sizing
  - Configuring
  - Price Negotiation
  - Contract Negotiation
  - Contract Approval
  - Contract Administration
  - Installation Planning
  - Shipping and Receiving
- Install - Hardware Setup and Test
  - Physical install
  - Power cabling
  - Network cabling
  - I/O Device cabling
  - Firmware config setup
  - Test
- Install - Software Setup and Test
  - Operating system install and config
  - Test
  - Application middleware install and config
  - Test
  - Tools/Utilities install and config
  - Test
  - Application install and config
  - Test
- Install - User(s) Setup and Test
  - Network connectivity and function
  - Storage device connectivity and function
  - Security credentials
  - Test
  - Handover to user(s)
- Operate
  - Automation
  - Monitoring
  - Answering Questions
  - Solving Problems
  - Making Changes
  - Boot System
  - HealthCheck System
  - Debug System
  - Fix System
  - Update System
  - Shutdown
- Retire
  - Trade-In Price Negotiation
  - Trade-In Contract Negotiation
  - Trade-In Contract Approval
  - Trade-In Contract Administration (Receivables)
  - Scrub application data stores
  - Remove from network
  - Remove security credentials (userids)
  - Un-cable network
  - Un-cable power
  - De-Install
  - Ship out

System z Cost & Value

Customer Examples

Consolidation to zVM-Linux
New Applications on System z
CICS growth on z
Rehosting to UNIX

Large Systems Update
16th – 18th October 2007
Stockholm and Gothenburg

Customer (a) - Consolidation to zVM-Linux

Customer is a Telecommunications company

- **Some core systems (eg. Customer Billing) run on System z but …….**
- **most new applications have been put onto UNIX and Wintel servers**
- **resulting in many thousands of servers, in hundreds of racks, in many different Data Centers**

The current Data Centers are now full but the business requirement is to install many hundreds of new servers in 2007 to support new business growth

Main issue is –

- **should the customer buy or build one or more new Data Centers or ….**
- **can they quickly consolidate/virtualise servers to free up space for the new servers?**

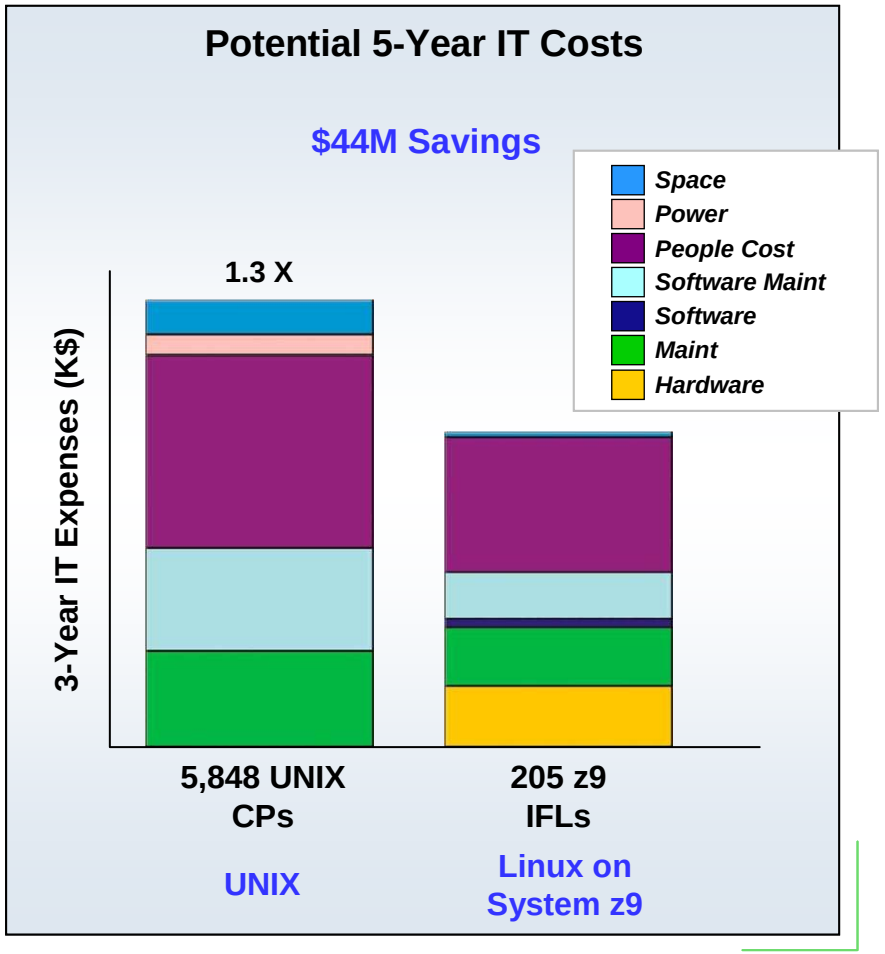
Potential IT Cost impact of mainframe consolidations

Your IT Cost may vary:

- **Potential for dramatic reductions in software expense for processor based licenses**
  - **Software savings driven by eliminating 5,848 S+S charges for all consolidated SW applications**
- **Significant reductions in power and cooling costs are possible**
  - **97% Savings in KWatts and Energy Costs in this scenario**
- **Significant one-time Facilities Cost Avoidance**
  - **Reducing the number of racks saves an additional $30M USD in New Data Center build costs**
- **People savings from virtualization**
- **Increased processor utilization**

Workload consolidation using Linux on a mainframe can result in significant IT Cost savings

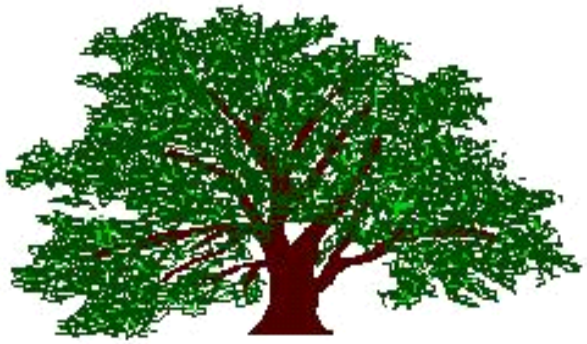
Telecom Company IT Costs
Varied Unix Workloads
5-Year TCO (Scorpion Study Results)



Potential Environmental Savings

1528 UNIX servers vs 4x System z9 54-way frames -

Environmentals	Current	Alt.Case
Total RackU	9,198	na
Racks	500.0	4.0
Total kW	2,203	41
Adjusted kWh/yr	19,396,862	360,956
Heat BTU/hr	5,038,017	93,752
CO2 tonnes /yr	8,341	155
Carbon tonnes /yr	2,276	42
RIPs /kW	425	2,400
RIPS / tonne CO2	112	634
W /m2	14,373	6,000
RackU / Server	6.0	2.0
Watts / Server	1,442	200



CO2 Reduction = 27,073 Trees

Source: Scorpion Study results 2007

Other consolidation to zLinux examples

Canadian government entity improves citizens' services while saving money and improving operation

Centre de services partagés Québec

- Government of Quebec, Canada
  - Relies heavily on large Web-based application environment to serve the needs of its citizens
  - DGTIC (Direction générale des technologies de l'information et des communications) supports applications & underlying infrastructure
- Situation:
  - Fast growth of applications & infrastructure (150+) distributed servers, staffing pressures
- Problem:
  - Slow deployment of new applications, Limited general manageability (including backup/recovery), Rising software licensing costs, especially for the Oracle environment
- Solution:
  - z9 EC was ideal choice: robust virtualization capabilities, proven high availability and ease of management
  - Consolidated approximately 60 hard-to-manage distributed server environment (Sun UNIX servers) to single z9 EC server running SUSE Linux Enterprise Server (SLES) operating system under z/VM V5.2
    Linux-only System z9 server with 5 IFLs and 48GB of memory
  - 80+ Oracle 9i database instances consolidated to the z9
    consolidation from 60 servers down to 1 server resulted in significant reduction in Oracle licenses
    plan to move numerous Oracle 10g instances as well

Result: New application deployment time fell from several weeks to days
Saved CA$1.2M (software licensing) & reduction in management costs
Drastic improvement in backup and recovery operations

Nationwide: Avoids new data centre build, Saves millions with Linux on System Z

- ***Nationwide*** is a US-based Fortune 100 insurance & financial services company
  - $21B+ revenue, 30,000+ employees (6,000 in IT)
- ***Situation:***
  - 5000+ distributed managed servers with low utilisation
  - Linux and J2EE being used for new applications, with no single point of failure
- ***Problem:***
  - High cost, including limited data centre power and floor space (a new facility would cost $10M+)
  - Long server provisioning process
  - Need to "over-provision" server capacity to meet peaks, leading to inefficient server utilisation
- ***Solution:***
  - Server consolidation to System Z with virtual Linux servers (z990, IFLs, z/VM, Linux…)
  - **350 servers virtualised with 15 z990 IFLs, supported by 3 FTEs**
    including 12 mission critical applications with 100,000+ users/day
  - Fast solution deployment (4 months)

- ***Result:*** **Significantly reduced IT cost, rapid server deployment, IT simplification**

  - 50% reduction in web software monthly costs, 80% reduction in floor space & power consumption
  - 50% reduction in hardware & OS support effort; significant savings in middleware cost
  - Significantly faster server provisioning (from months to days)
  - Dynamic allocation of compute power eliminates the need to "over-provision"
    Provisioned 22x the anticipated load for a major advertisement using CoD (1 processor for 2 weeks)
  - Simple, robust mainframe solution with "built-in" high availability & disaster recovery

Customer (b) - New Applications on System z

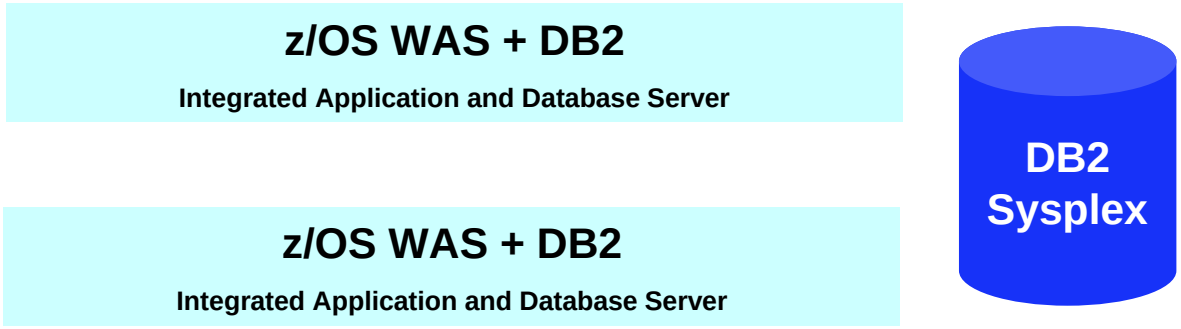
Customer is medium sized Bank

- **The Bank has selected a new application (**corebank) to replace the current IMS based system.**
- **CIO understands System z value and the Bank has 20+ years good mainframe experience.**
- **CIO is concerned about the current mainframe costs.**
- **CIO believes that the zCosts for the new **corebank system will be much more expensive than alternative UNIX based system.**
- **CIO wants IBM to document a business case for it to run on System z**

The topologies considered for **corebank

Option 1 – AIX WAS on System p + AIX Oracle on System p

Option 2 – z/OS WAS and DB2 on System z



Projected IT Costs – Summary

p**corebank + zRemaining	Costs
HW **corebank	€ 7,000.00
SW **corebank	€ 3,717.00
Extra People **corebank	€ 1,260.00
z9 HW Remaining workload	€ 4,950.00
z9 SW Remaining workload	€ 18,678.00
Total for 3 years	€ 35,605.00
z**corebank + zRemaining	Costs
HW **corebank	€ 8,000.00
SW **corebank	€ 4,764.00
Extra People **corebank	€ 0.00
z9 HW Remaining workload	€ 4,950.00
z9 SW Remaining workload	€ 18,678.00
Total for 3 years	€ 36,392.00

- *These cost estimates are calculated over a 3 year period, are based on the sizing of System P and Z using the ('worst case') mips sizing method*
- *The Java workload within **corebank on System Z is assumed to exploit the zAAP engines. The hardware and software cost cases reflect this*
- *Your IT staff agree System Z can accommodate **corebank without the need for additional staff. It is likely that the UNIX environment would require more staff to handle the **corebank requirements*
- *The z9 hardware and software costs for the remaining mainframe workload are shown as identical for the System P and Z cases*
- *No allowance has been made in these estimates for the phasing out of the current core banking workload and the phasing in of the **corebank based system. For simplicity we have assumed that the new system is installed in year 1 and that the 'remaining workload' also applies from year 1.*

- **Note – items not included in the above case:**
  - **As ***corebank* **is implemented, the current IMS load reduces and Z capacity can be reused by the new workload. This avoids the need for some new z9 capacity upgrades.**
  - **DB2 on z/OS exploits z9 hardware data compression. This could reduce zDB2 storage capacity by 50% or more. zDB2 should have significantly lower Storage and SAN infrastructure costs than the pOracle option.**

Incremental Z + Z solution is 36.4 Million Euros
Incremental P + Z solution is 35.6 Million Euros

Mainframe Software Cost Summary

	Legacy	**corebank	K Euros per month	Percent
	vWLC MSUs	zNALC MSUs	Estimated costs	vs Today
Today	406	0	405	100%
Remaining after **corebank migration	282	0	338	83%
Remaining + **corebank 120 MSUs	282	120	386	95%
Remaining + **corebank 316 MSUs	282	316	430	106%
Remaining + **corebank 510 MSUs	282	510	462	114%

- These are initial cost estimates based on the work completed during this timeboxed study
- The estimate of the z/OS workload remaining (282 MSUs) after the implementation of ***corebank* should be reviewed once a more detailed design is understood
- The sizing for ***corebank* should be reviewed once the **corebank performance tests have been completed with z/OS and DB2
- The exploitation of zAAP and zIIP engines should also be carefully reviewed following the completion of IBM's detailed work with the package vendor during the DB2 porting exercise

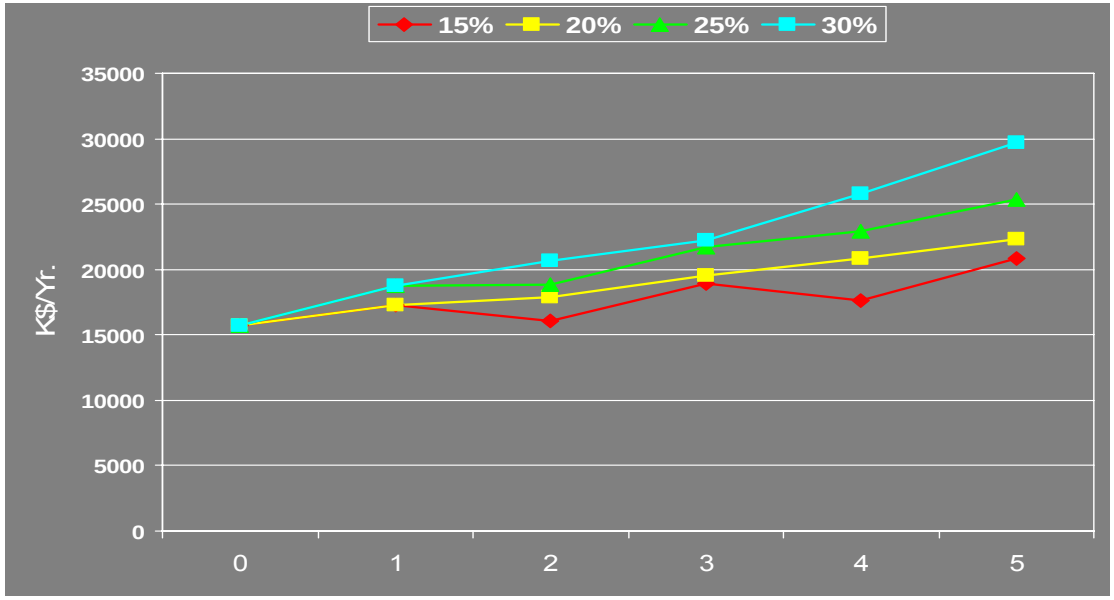
Estimated Increase in Mainframe Software Cost of only 14%
Optimise the Z Software Stack

Customer (c) – Incremental costs on System z

Customer is medium sized Bank

- **The Bank's core business systems run on CICS/DB2.**
- **CIO understands System z value and the Bank has many years good mainframe experience.**
- **CIO is concerned about the increasing mainframe costs as new banking products, new ATMs, new branches and acquisitions drive significant business growth.**
- **CIO wants IBM to document how the System z costs would increase for different growth scenarios.**

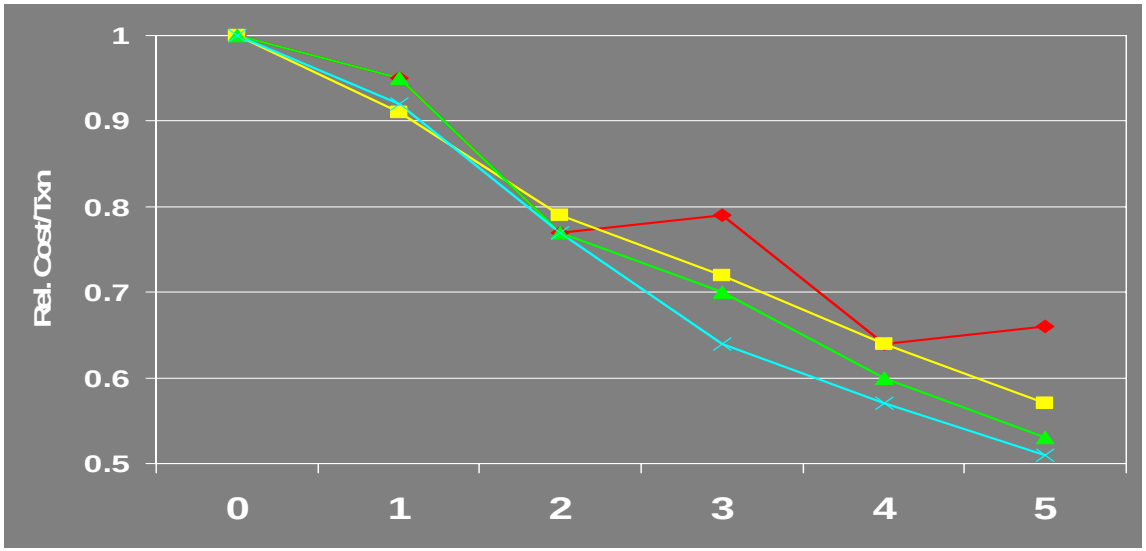
Case Study – Projected Evolution of Cost/Core CICS Txn over next 5 Years



Total Cost increases, but not as fast as Txn Volumes

eg 5 Years at 30% pa Growth
= 3.7x Txns at 1.9x Cost
= 0.51 Cost/Txn

Over 5 years at 20% annual growth
2.5x transactions at 1.4x current cost.
Cost per Tran. drops to 50-60% of current



Note – this case assumes an upgrade to new System z technology every second year – increased speciality engine size and Technology Dividend

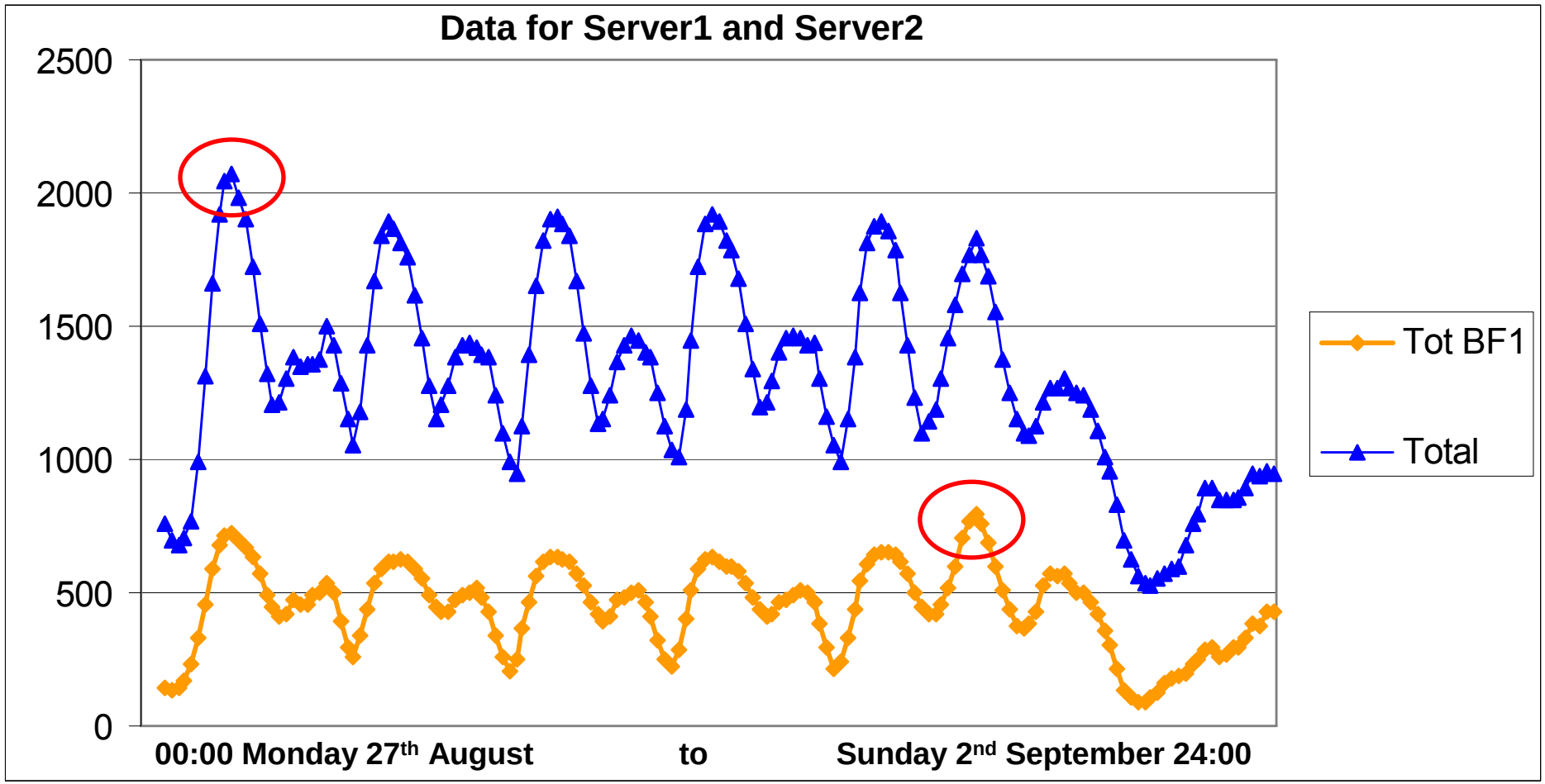
Customer (d) - Rehosting to UNIX

Customer is an Application Service Provider

- **CIO is concerned about the costs of System z.**
- **Other server vendors are telling him that a move to UNIX based servers could save money.**
- **CIO wants IBM to document the costs of offloading the BF1 workload from System z onto System p**

Current Mainframe Utilisation

Calculated MSUs - 4 hour rolling average



Peak for total workload - 2100 MSUs Monday 14:00
Peak for BF1 workload (candidate for offload) - 800 MSUs Saturday 01:00

Projected costs after Rehosting to System p

No Growth costs profile	2007	2008	2009	2010	2011	2012	5 year total
Mainframe costs as today	75.84	75.84	75.84	75.84	75.84	75.84	379.21
rehost BF1 workload to AIX							
costs after rehosting - MF remaining workload	75.84	62.19	62.19	62.19	62.19	62.19	
costs for BF1 on pAIX (including migration)		26.72	12.12	12.12	12.12	12.12	
total costs after rehosting		88.91	74.31	74.31	74.31	74.31	386.14
delta to todays costs		13.07	-1.54	-1.54	-1.54	-1.54	6.93

Note – costs above include Hardware, Software, Maintenance, Support, Facilities (Power and Space), Service Delivery Staff costs plus a Migration cost estimate

- In estimating the costs of an AIX server to run the workload, we did not assess the complexity and duplicate costs of running the z/OS and AIX applications in parallel. This will add further costs to those shown here.

- We did not assess the technical feasibility of migrating the CICS/IMS/DB2 and Batch workload to AIX. There is not an identical software stack in the UNIX environment and therefore many compromises will need to be taken that could impact Systems Management and Qualities of Service. These could add to the costs of the UNIX based solution.

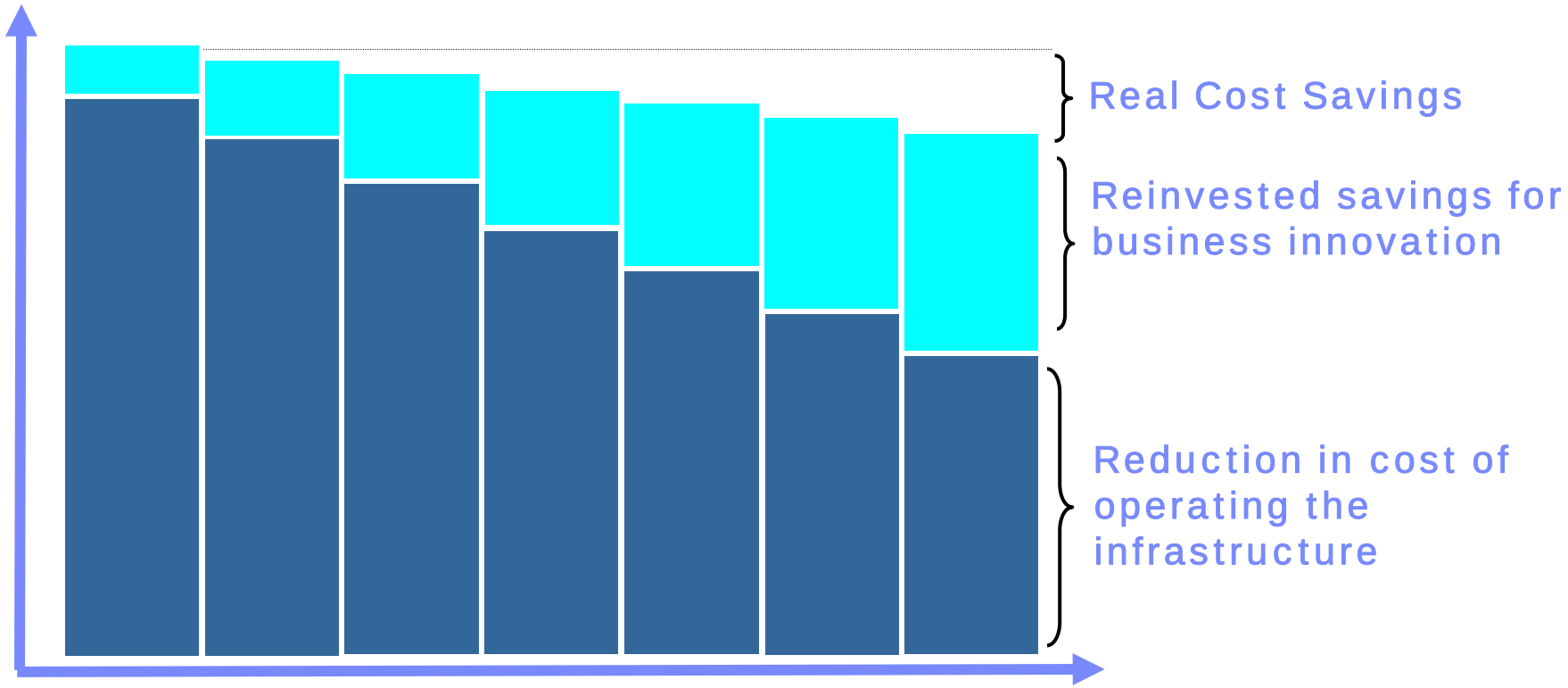
System z Cost & Value

Closing Thoughts

Large Systems Update
16th – 18th October 2007
Stockholm and Gothenburg

IT Rationalization for optimization and improved Costs

Today, businesses need to continually deliver efficiency gains to enable them to re-invest part of their savings in enabling business innovation



Optimising IT costs requires knowing what your IT costs are !!

If you have no accurate measures . . . how do you know that IT Is effective?

. . . on average, approximately 15% of Global IT budgets are attributable to mainframe-related purchases, contracts, and activities, but, at the same time, 25-30% of the IT budget is recovered via billing for mainframe-resident services . . . so mainframe costs are usually significantly overstated.

note what this is saying: - mainframes are often "overcharged" by 25-50%, and distributed are "undercharged"

. . . in the past, chargeback systems focused on isolating IT system events that could be relatively easily tracked and could generate sufficient 'revenues' to cover the IT budget. Now, however . . . , the focus is on building systems that reflect the real underlying relationship between IT resource consumption and cost accrual. Despite this change in focus, mainframe platforms remain the keystone for chargeback architectures, particularly in the financial services industry . . .

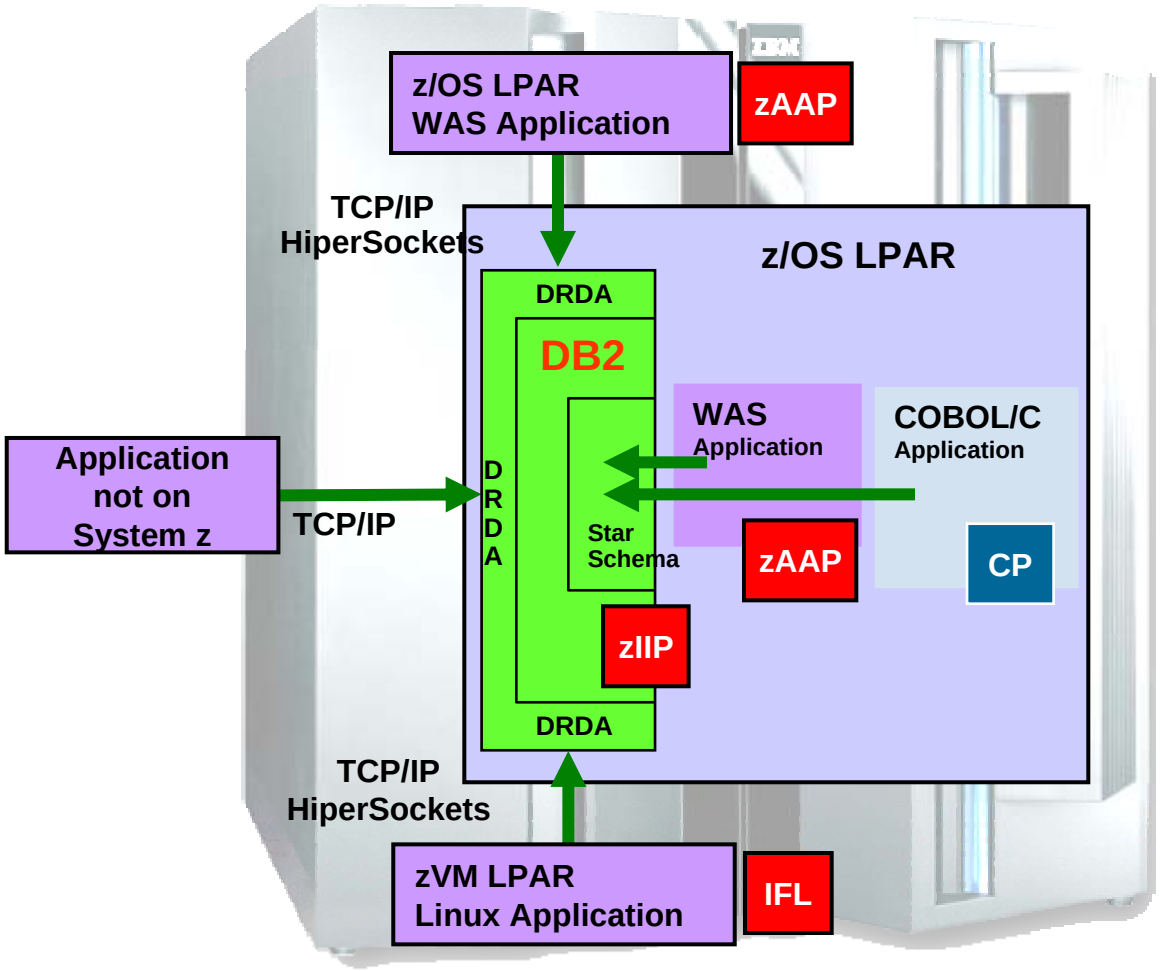
Will Cappelli, Vice President, META Group

IBM Mainframes provide technology and tools to track and report accurate resource consumption in mixed workload environments, to help control IT cost and to improve IT investment decisions

Meta Consulting has developed a chargeback methodology to enable enterprises to allocate costs more equitably and accurately across all platforms in the IT infrastructure.

Solutions from Isogon provide customers the tools they need to manage their software costs.

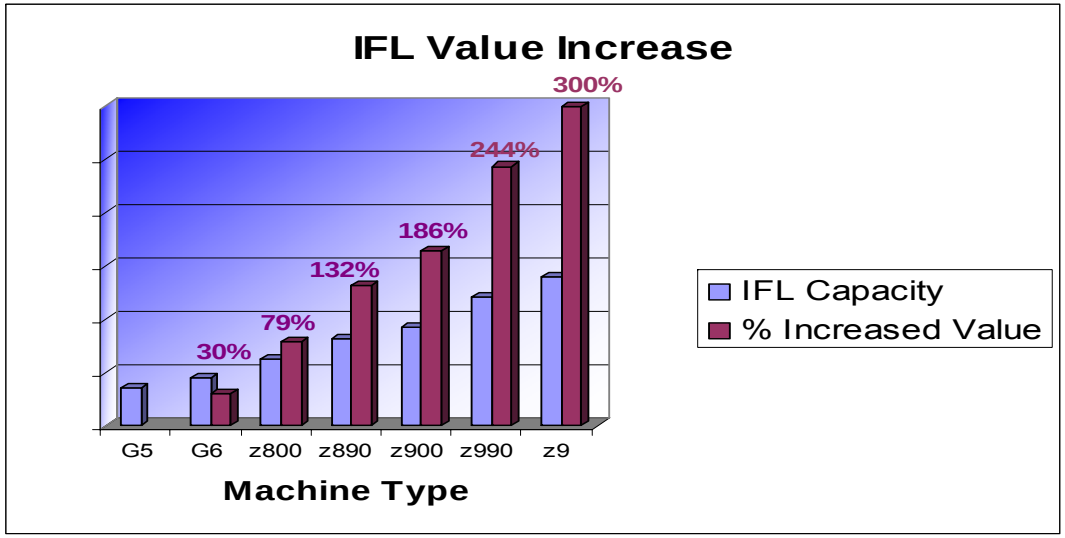
System z Speciality Engines ..... they work together to help lower costs ...

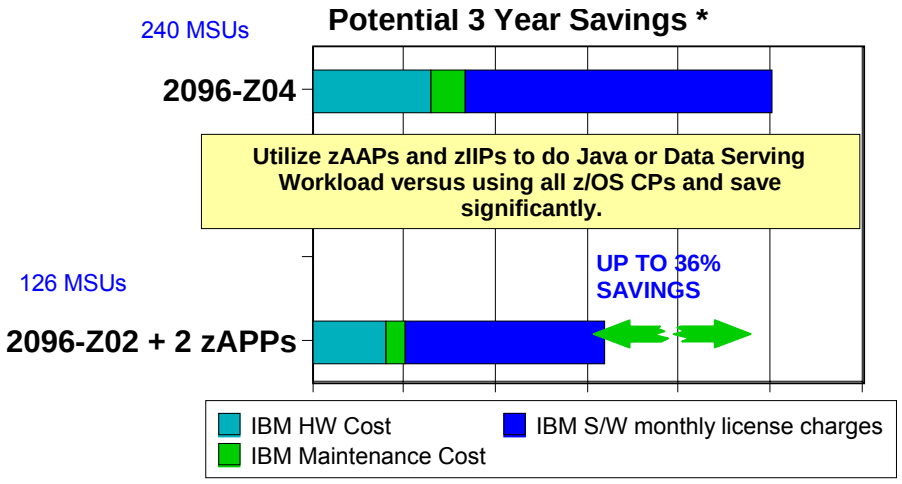


IBM System z9 speciality engines can run independently or complement each other

Potential of Speciality Engines

- IFL Price has remained constant for z9 EC, z990 and z900
- IFLs, zAAPs and zIIPs move with upgrades
  - Typically free capacity comes with a technology upgrade
- Potential software cost benefits
- Distributed model over same time:
  - 2 Technology Refreshes (New Hardware)
  - 2 System migrations





* Based on estimated capacity measurements, these numbers will be updated; your potential savings may

The New IBM Mainframe - Business Value and IT Cost Optimisation Checklist

"Addressing Today's IT Challenges with Innovation and IT Investment Protection"

Enable Rapid Business Innovation & Growth

- Transform and modernise existing "stable & mature" application and data assets to improve time to market
- High productivity tools for traditional Z applications
- Exploit an open, flexible and responsive computing environment to develop and deploy new application models
- Avoid the multi-year IT 'freeze' caused by major migrations
- Free up IT resources to develop new customer/business capabilities, not maintenance and problem fixing

Deliver High Quality Services to Business Users

- Platinum service for "Core" and Gold service for "Distributed"
- Provide the "heart and lungs" to run the business
- "Always open for business" - near continuous operations
- Synchronise DR across platforms using GDPS
- Keep data safe, avoid outages and their hidden costs
- Unlimited scalability using Sysplex and On Demand capabilities
- Virtualize at all component levels to maximise resource utilisation, work done and allocate instant peak capacity
- Reduced floor space and power/cooling consumption
- Faster provisioning of servers (weeks to hours)

Tighter Security, Compliance and Audit

- Safe from attack – protecting data and privacy
- Simplify & integrate (reduce complexity) to assist audit
- "System-of-Record" and central control and logging

Optimise IT Costs and Improve IT ROI

- Re-use existing IT application and data assets to reduce the scale of new application development investment
- Consolidate, simplify and integrate distributed servers and applications to reduce the total number of HW and SW assets - and their increasing people support costs
- Automate workload management to reduce IT staff cost

- **Use Z specialty engines to reduce incremental cost**
- **Use Z capacity-on-demand and capacity back-up options to minimize IT cost and increase IT flexibility**
- **Exploit Z SW pricing for lower cost incremental growth**
- **Exploit sub-capacity Z SW pricing to align cost with use**
- **Use IBM financing, generation to generation upgrades, and high Z residual values to improve cash flow and ROI**

- **Predictable, low incremental cost of Z capacity**
  - **for organic growth of core transactional applications**
  - **for new J2EE (zAAP) and Linux (IFL) applications**
  - **for data, XML and security offload (zIIP)**
- **Continuing reduction in unit cost per core Z transaction**
  - **hardware price/performance, software technology dividend**

How you can optimise your costs on the Mainframe

1. As you grow the core-business MIPS –
   - exploit the lower prices from incremental growth
   - keep on current levels of Hardware and Software
2. Use the latest technology and pricing models
   - Upgrade to System z
   - Utilize specialty processors – zIFLs, zAAPs and zIIPs
   - Utilize sysplex aggregation
   - Exploit “sub-capacity pricing”
   - Optimise software costs and T&C
3. Deploy new mixed workloads on the mainframe – exploit zNALC software pricing
4. Consolidate workload onto System z - using z/VM and IFLs
5. Maximize utilization
   - Drive mainframes at 90+% utilization, 24 hours by 7 days
6. Minimize other costs
   - Minimize software tool costs – remove duplicate software
   - Minimize outages and security breaches…
7. Use automation to control labour costs

The New Mainframe is a Cost-Effective and Valuable Platform

- Create a financial/technical model of the server cost profile for your enterprise
  - select appropriate server strategies - incremental growth & core applications
- Start a tactical project to consolidate/virtualise servers to zLinux and Blades
- Delayering and application/data integration is the key to reducing IT cost
  - “core” vs. “surface” applications (big tradeoffs between resilience & innovation)
  - The big costs are in the many linkages between apps, and the ongoing testing

- Understand the Mainframe future vision - for core enterprise applications and enterprise data
  - exploit major investment in core applications (CICS, IMS, DB2..)
  - extend into data warehousing, analytics, bulk data management, archiving...
  - understand Z performance evolution and integration of specialised accelerators, etc

- Exploit DB2 on the mainframe – especially the integration of CICS & WAS
- Reject Rehosting – it is very costly and freezes IT and the business for at least 2 years
- Broadcast the ‘New Mainframe’ Value Proposition
  - Engage with all technical architects - applications, data, systems,
  - Senior IT execs to be communicating mainframe value to LOB executives
  - Engage IBM – to create solid business cases

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Notes:

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