Outside Analyst View

2008 On – Market Outlook

System z Mainframe – Trends, Directions

Software Strategies
Ian Bramley

IBM System z SW Premier Event,
Valencia, Spain, May 6 2008

IBM

2008 On – System z Market Outlook

Analyst Agenda Today

1. Our Analyst Agenda, System z Research
2. System-Platform Market Mega-trends, Directions
3. System z10 & Mainframe Resurgence
4. Mainframe Evolution – What Our Data Shows
5. Server Market Dynamics, MPU Wars, IBM's Competition
6. System z – 4 Strategic, High Growth/Value Software Areas
   - IBM Smart SOA on z
   - AD & Enterprise Modernization on z
   - Information On Demand
   - Service Management Center on z
7. Distributed Computing Disaster – System z Consolidation To The Rescue
8. Analyst Summary/Conclusions

Sources – Recent System z Research

Software Strategies

1. "New IBM Smart SOA, Enterprise Modernization, & AD Software Powers System z's Enterprise-wide SOA Role." New White Paper, to be published May 2008, 64 p.p., 20 charts & tables.

Out Soon

2. "System z Central to IBM's Burgeoning Information on Demand & Cognos Buy, New IOD Software Powering Strong Growth." White Paper, to be published May 2008, 62 p.p.,18 charts & tables.

New

3. "Service Management Center for System z Underpinned by Powerful Tivoli z Management Portfolio." White Paper, to be published May 2008, 44 p.p., 14 charts & tables.

New

4. "Mass Distributed Server Consolidation – System z Mainframe Linux-on-z/VM Extreme Virtualization far Outclasses Over-hyped x86/x64 Approaches." White Paper, January 2008, 72 p.p., 27 charts & tables. *(Shows Linux-on-z/VM extreme virtualization enables mass-x86/x64 consolidation onto System z for huge savings.)*

Jan 2008

SOFTWARE STRATEGIES

Global Technology Futures?

Great IT Leader Forecast s

"I think there is a world market for maybe five computers."

Thomas Watson, chairman of IBM, 1943

"Computers in the future may weigh no more than 1.5 tons. "

Popular Mechanics, 1949

"There is no reason anyone would want a computer in their home. "

Ken Olsen, founder of DEC, 1977

"640K ought to be enough for anybody. "

Bill Gates, 1981

"Prediction is difficult, especially about the future"

Yogi Berra

SOFTWARE STRATEGIES

Top 12 Mega-trend Systems Issues 2008

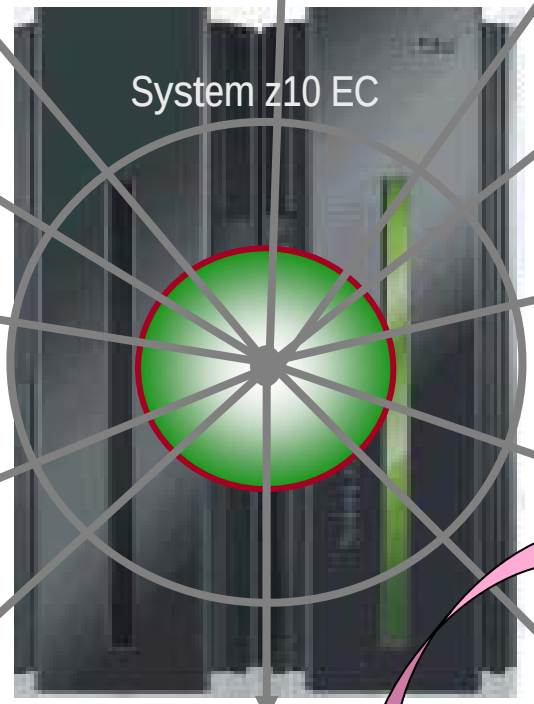
System z Mainframe Offers Top Solutions

Resurgence of scale-up SMPs with virtualization
Major efficiency, TCO, power, QoS advantages rediscovered

Virtualization key to IT optimization
For both servers & storage

"Greening IT" movement against global warming
The Green Data Center

Cutting "Outside the Box" IT costs is key
Staffing, software licenses, power/cooling



SOA biggest ever software model change
Soaring new investments drive infrastructure change

Power & cooling now major issues/costs
On every platform

System,chip, & SOC innovation/technology matters more today
Rapid rate of advance

Advanced systems management/automation main differentiator
For productivity, TCO, QoS, ITSM

Blade format on track for $10B by 2010
Huge advantages in consolidated infrastructures

64-bit MPUs near across the server board
Whether x64, RISC, IA64, z9, z10

x86/x64 ISS unit growth slower in 2008?
"Game-up" for basic x86 ISS?

Multi-core, multi-thread, SOC MPU's spreading fast
In scale-up and scale-out systems

SOFTWARE STRATEGIES

z10 EC High-End Mainframe Storms In

Our One-Chart Take & What's New!

Massive Scalability, Capacity:
<64-way SMP, 1.7X capacity*, 3X memory*, <30,250 MIPS, 1-4 books.

Stunning z10 MPU:
Quad-core, 4.4 GHz. 2.56X*, 3 MB L2/core, 991M transistors, 65 n.m, SOI, on-chip crypto, data compression, Decimal FP* X10, 182 GB/s chip bandwidth, POWER 6 sibling.

Superb, World-Class Middleware & Tool Software:
Smart SOA, IOD, AD & Enterprise Modernization,, Service Management Center z, plus base.

"Gold Standard" Virtualization:
<60 dynamic LPARs, <64 CPs/LPAR SMP. Virtualised CPUs, I/O, Memory, Net. Runs 2X more z/VM virtual servers*, 4 LCSS, HiperDespatch*.

Our Assessment:

"z10 EC is an innovation, technology & MPU tour de force by IBM....."
"Far more dramatic than regular mainframe generation upgrades……"

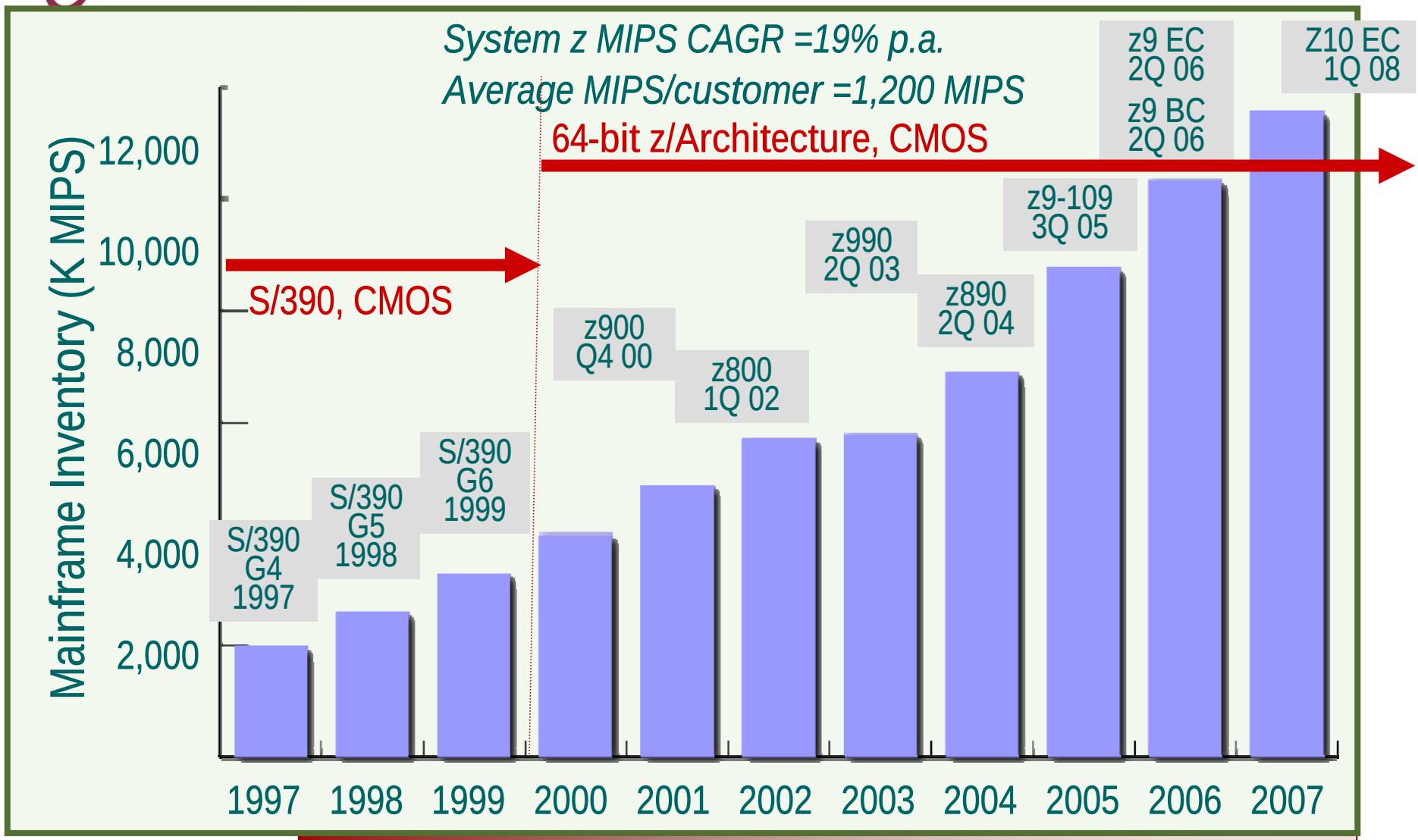
Recognise the scale of IBM's z10 investment!
$1.5B hardware investment, used 5,000 IBM staff, up 50% on z9
$2.0B software investment, 7,000 IBM staff
$3.5B, 12,000 people total

* = Comparisons with z9 EC S54

SOFTWARE STRATEGIES

IBM Mainframe Installed Capacity Soaring

Up 6X 1997-2007 & Huge Resurgence



SOFTWARE STRATEGIES

New System z Workloads Drove Growth

60%+ New MIPS 2000-07 For New Workloads

SOA & Enterprise Modernization.
(Implementing SOA, BPM, Web 2.0. Moving forward wealth of customers existing mainframe applications into this next-generation application architecture.)

New-generation Java EE Web Application Serving:
(e.g. Using WAS on z/OS, encouraged by zAAP specialty engine, and/or on zLinux.)

Mass Distributed Server Consolidation with Linux-on-z/VM:
(e.g. Web, applications, & DB serving, mail/collaboration, etc., onto many virtual servers under z/VM, encouraged by IFL specialty engine, and/or all-IFL System z machines.)

Deploying New zLinux Packaged Applications:
(e.g. Now over 1,300 business applications available from 400 z Linux ISVs, encouraged by IFL specialty engine & all-IFL System z machines.)

High-performance z/OS DB2 Data-Serving:
(For SOA applications, for other platform apps., for data warehouses, for Information On Demand. Encouraged by zIIP specialty engine.)

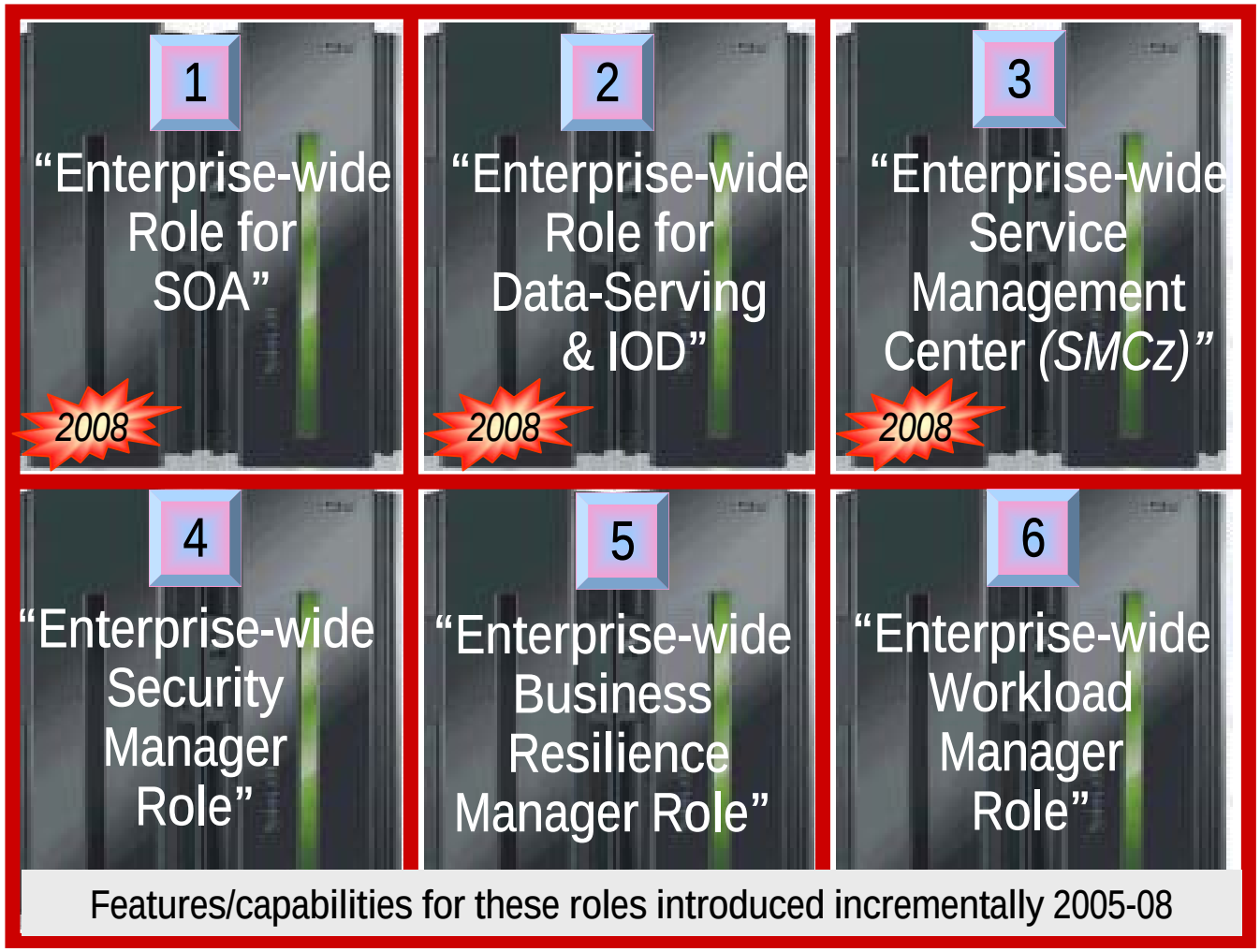
Newer Mainframe Enterprise-Wide Roles:
- Enterprise-wide Role for SOA
- Enterprise-wide Role for IOD
- Enterprise-wide Service Management Center (SMCz)
- Enterprise Workload Manager
- Enterprise Security Manager
- Enterprise DR/BC Manager

Parallel Sysplex Mainframe Clusters & Massive Scale & Highest Availability:
(Encouraged by ICF specialty engine)

Running UNIX Applications /Packages on z/OS:
(Via UNIX System Services for z/OS.)

System z10 Newer Enterprise-Wide Roles

Major IBM 2008-On Emphasis On Roles 1-3



Why On System z?

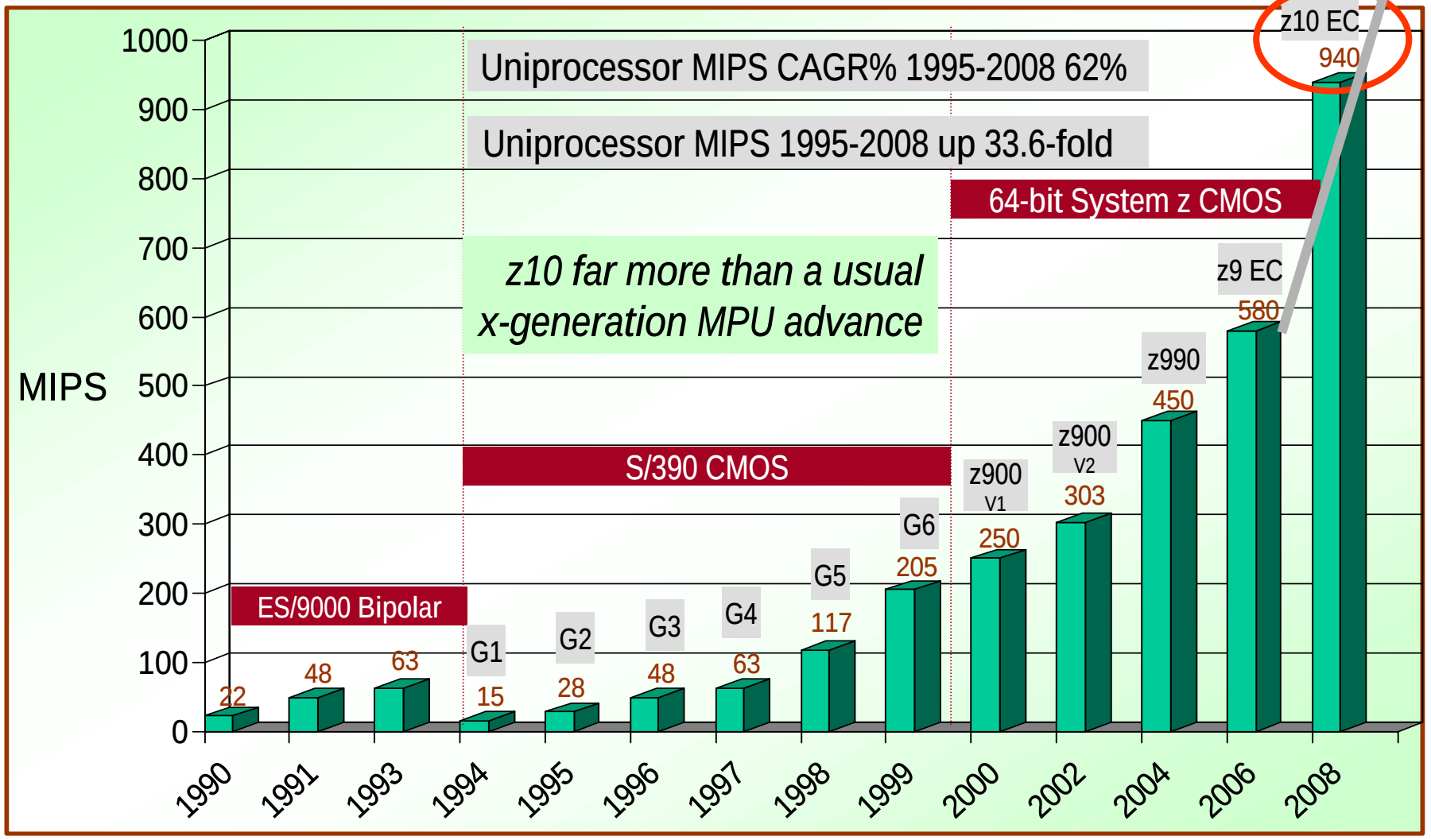
- Best software stack
- Simplified IT-in-a-box
- Most scalable
- Lowest TCO
- Fully virtualized
- Ultra-efficient
- Most secure
- Highest availability
- Greenest system
- Fully open standards
- Most manageable
- Greatest consolidator
- Deepest autonomics
- Lowest staffing...
- Fewest CPUs of SW
- Shared everything
- Lowest power use
- Lowest floor space
- An enterprise service bureau in one box

Extend highest System z QoS to role across whole enterprise IT

SOFTWARE STRATEGIES

IBM Mainframe – More Powerful CPUs

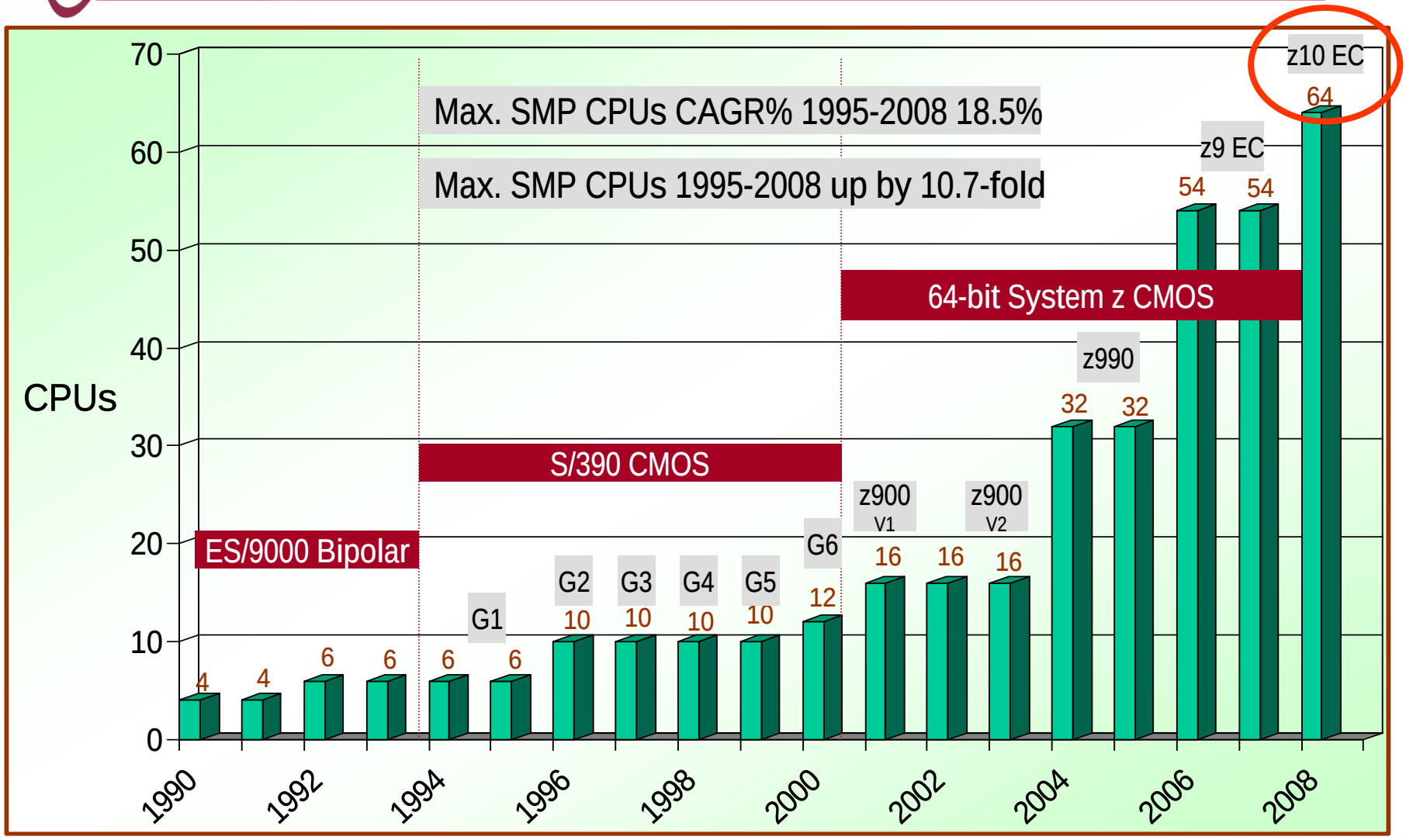
Uniprocessor MIPS 1990-2008



SOFTWARE STRATEGIES

IBM Mainframe SMP Scaling – More CPUs

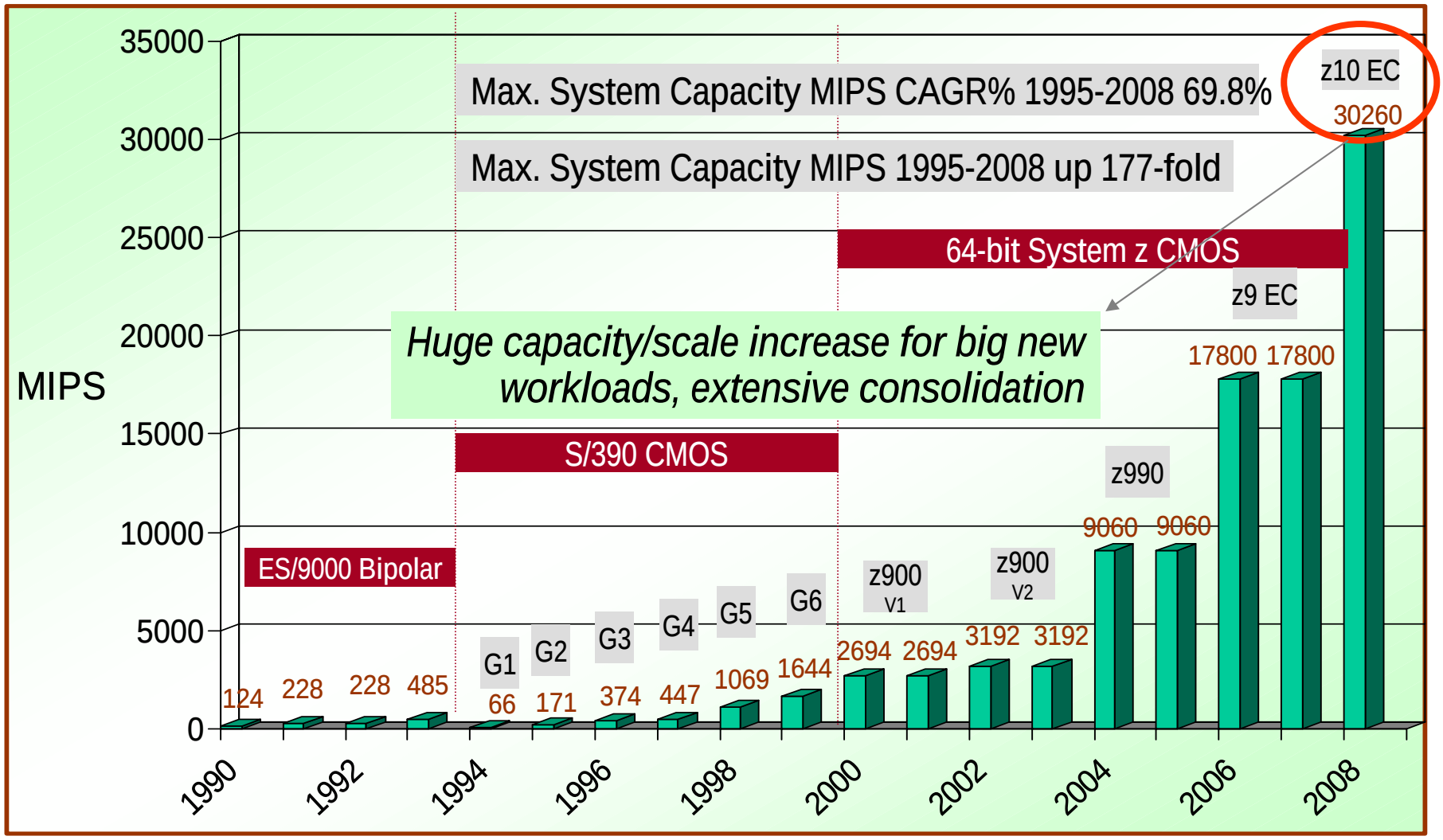
Max. No. of SMP CPUs 1990-2008



SOFTWARE STRATEGIES

IBM Mainframe – Max. Capacity Rockets

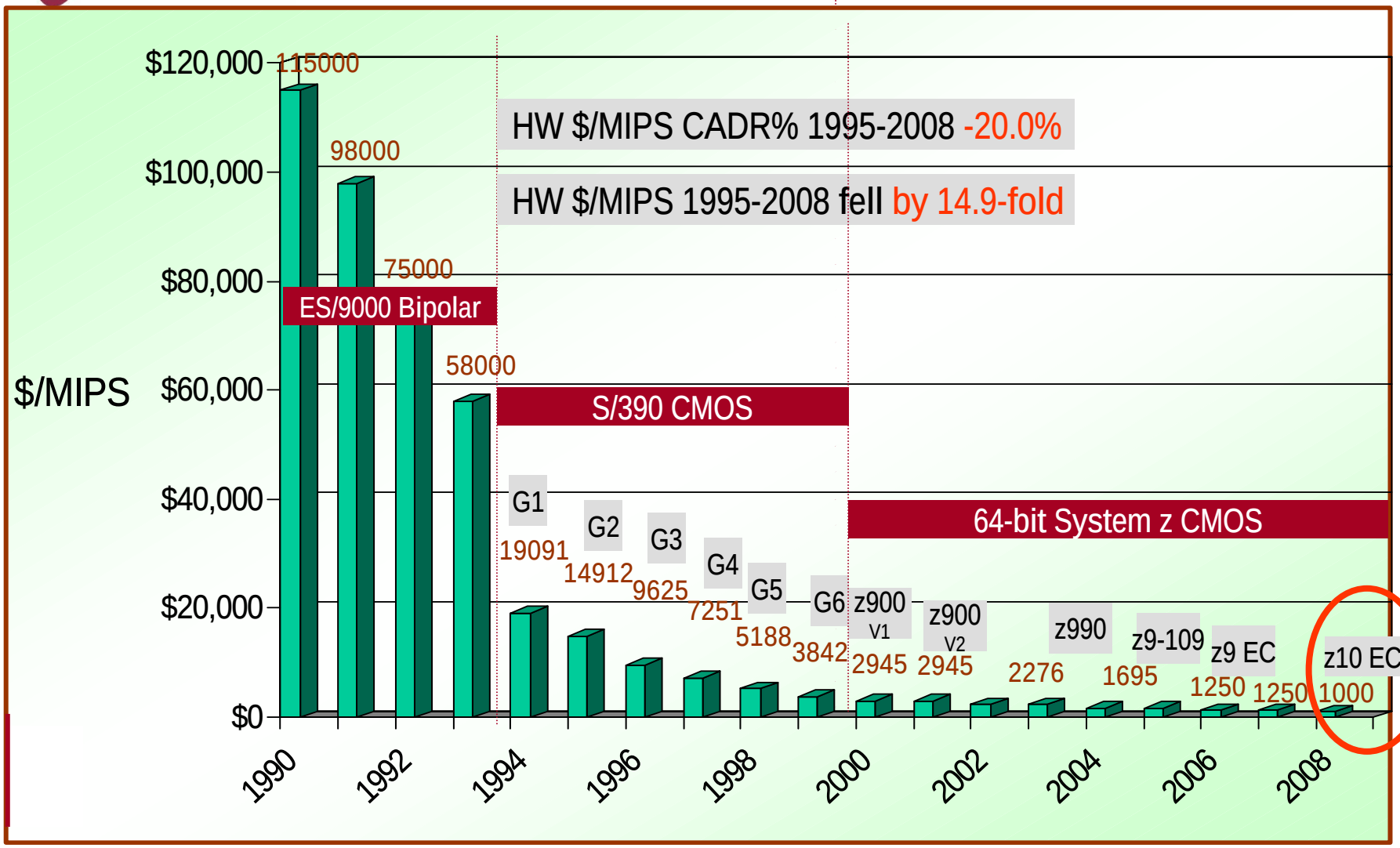
Maximum System MIPS 1990-2008



SOFTWARE STRATEGIES

IBM Mainframe Hardware Prices Fall

$/MIPSTop-End Hardware ca 1990-2008



Assessing Server Market Dynamics

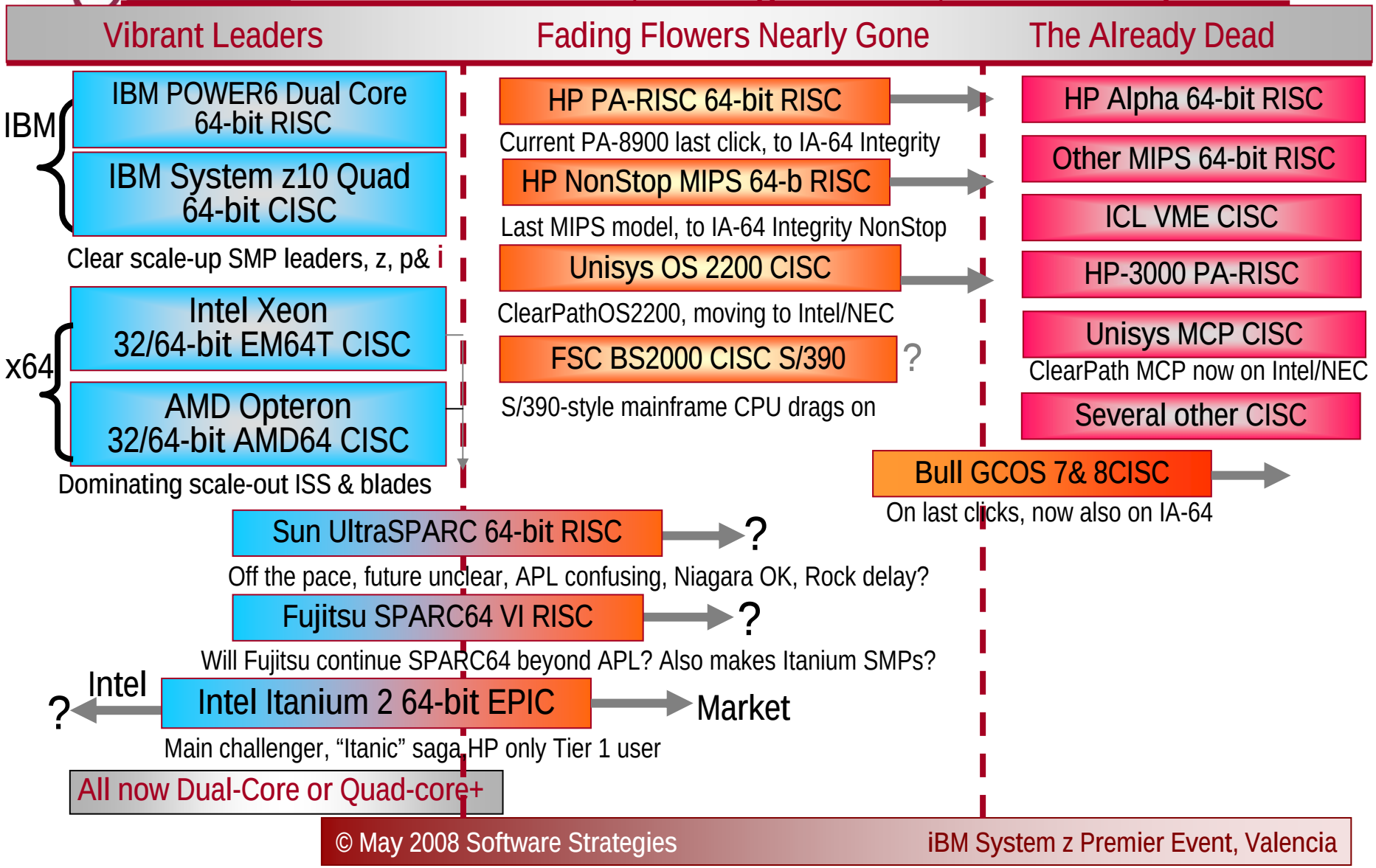
What We See Happening

- Swing back to big SMPs, high-tech., top-QoS last 5 years+:
  - *IBM System z, System p UNIX major winners/% gainers*
  - *All HP, Sun, Unisys, FSC, NEC SMPs all share/base losers*
- Mid-range segment squeezed down by:
  - *Large SMP-based workloads consolidation, from above*
  - *Fast-rising x64 & RISC, 64-bit scale-out servers from below*
- "Throughput computing"volume scale-out distributed servers:
  - *50% of today's $ server market, x64 93% of 2007 server units*
  - *Migrating fast to blade-format, away from bog-standard rack 1U,2U etc.*
- HPC a wider market, MPU+architecture-led/driven, IBM #1:
  - *Top-end, mid-range, volume-cluster, & hybrid cluster, sub-segments*
- Internet-scale data center/Cloud computing systems debut:
  - *New dense, modular, scale-out, pre-assembled cluster system class optimized, for Google, et al. IBM System x iDataFlex first tier 1 offering*

SOFTWARE STRATEGIES

Server-MPU Architecture Wars

Vibrant Leaders, Fading Flowers, The Already Dead

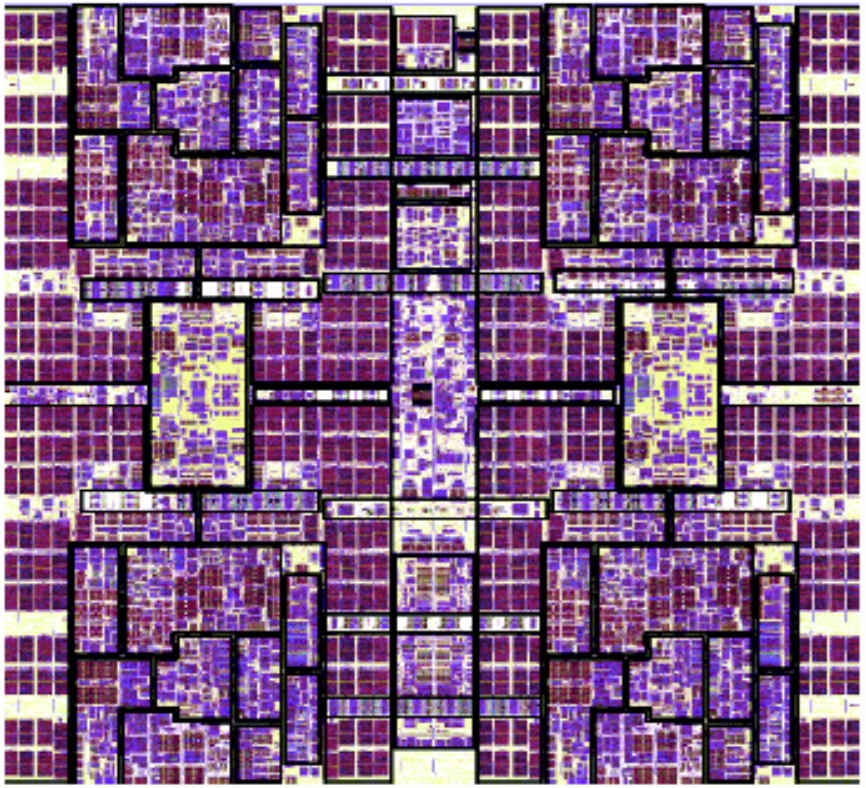


SOFTWARE STRATEGIES

IBM z10 Mainframe MPU

Our-View Absolute Blockbuster Chip

- New high-frequency z/Architecture microprocessor core
  - >4 GHz operation in system
- 4 cores per die
  - Each with 3MB private 2nd-level cache
- Accelerator engines
  - Data compression
  - Cryptographic functions
  - Decimal floating point
- Integrated SMP communications
  - Switch connects cores to SMP Hub chip
    - Shared cache and SMP fabric
  - Memory bus controller
  - I/O bus controller
  - EI3 technology up to 3 GHz bus speeds
- System interfaces
  - 2 x 48 GB/s SMP Hub
  - 4 x 13 GB/s Memory
  - 2 x 17 GB/s I/O



- 991M Transistors
- 138 Mb SRAM
- 6 km wire
- 21.7 X 20.9 mm die
- 1188 signal / 8765 total chip I/Os

HP Bids Goodbye To SMP/MPP Bases!

4 User Bases Melt Away & Resist Itanium

HP9000 PA RISC Base

Superdomes
(<32-W,<64 & 128-w PA8800, & PA-8900)

"rp" Mid-range
(<16-W, <32W , PA8800, & PA-8900)

HP AlphaServers

GS 320
(<16,<32,<64W, EV68CB, 1.24GHz.)

GS1280
(<16, <32,<64-W, EV7z , 1.3Ghz.)

HP NonStop Himalaya S-Class MPPs

(<16-P nodes, MIPS R10000, R12000, R14000, R16000 MPUs)

- PA-RISC HP9000 Superdome & "rp" mid-range base
  - *HP big sellers 2000-2006, now aging, off the pace, "dead" MPU*
  - *Superdome base ideal for System z P6 top-end replacement*
  - *rp7400/8400 16-32-way mid-range, new P6 570 knocks out*
  - *Many HP 9000 users going System p not HP Integrity!*
- Remaining high-end HP AlphaServers base & EOL
  - *2001-2005 last high-end GS320 & GS1280s face rough port*
  - *No Tru64 Unix on HP Integrity, better move to System p*
- Unsupported larger/later HP 3000s & Long past EOL
  - *Still c 80,000+ out, great System i candidate, poor HP options*
- HP NonStop Himalaya S-Class clusters/nodes & EOL
  - *All 2000s S72000-S88000 MIPS MPP systems aged, coming due replacement, architecture change options to System z, p or x*
- To be fair, HP also doing well in volume x64 & blade servers, PCs, printers, & financially, 2007-2008.

SOFTWARE STRATEGIES

Sun microsystems

Upper SMPs, MPUs in Disarray

SOA Middleware Software Tragic!

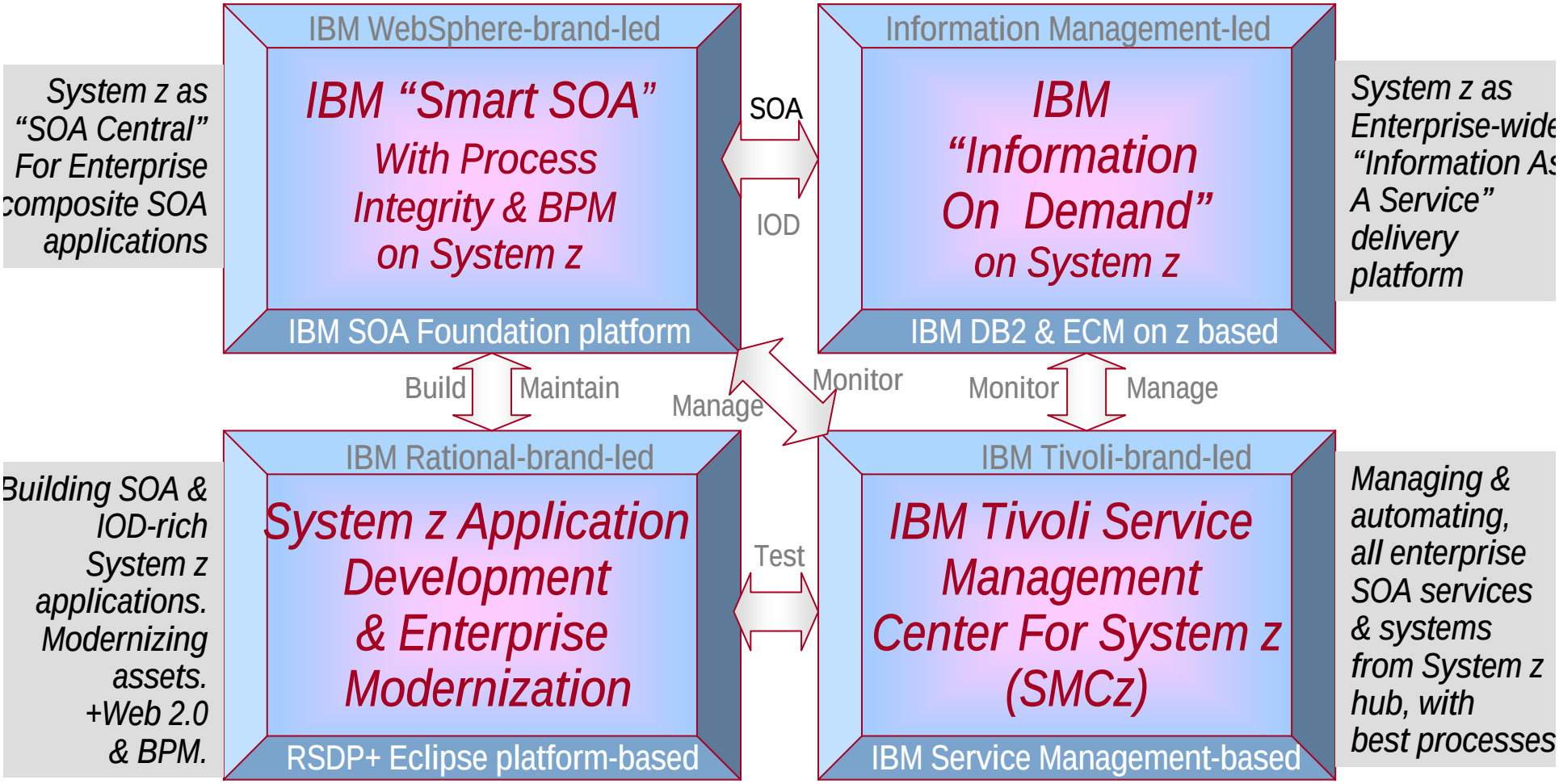
Products

- SOA middleware a train-wreck of a non-viable software business
- Despite great owned/bought software assets:
  - *Java, Java EE, SeeBeyond, etc,*
- MySQL open source DB software latest such addition:
  - *Past gives little confidence*

- UltraSPARC roadmap high-end gap:
  - *No new MPU since 2006*
  - *"Rock"MPU now delayed to 2009*
- Own Enterprise mid-high SMPs faded:
  - *UltraSPARC gap, aged systems, way off market pace!*
  - *Losing badly to IBM System p*
- Confusing Fujitsu APL SMPs line status, joint-developed with Sun:
  - *Fujitsu SPARC64-based SMP line*
  - *Was for joint sales from 2007 on*
  - *Sun reluctant to sell, uncommitted*
  - *Fujitsu SPARC64 long-term unclear, because of its Itanium line*
- But Sun low-end UNIX, x64 Intel & AMD servers did better in 2006-2007.

IBM System z Software – Q2 2008 Outlook

4 Strategic Areas, Each Huge Advances



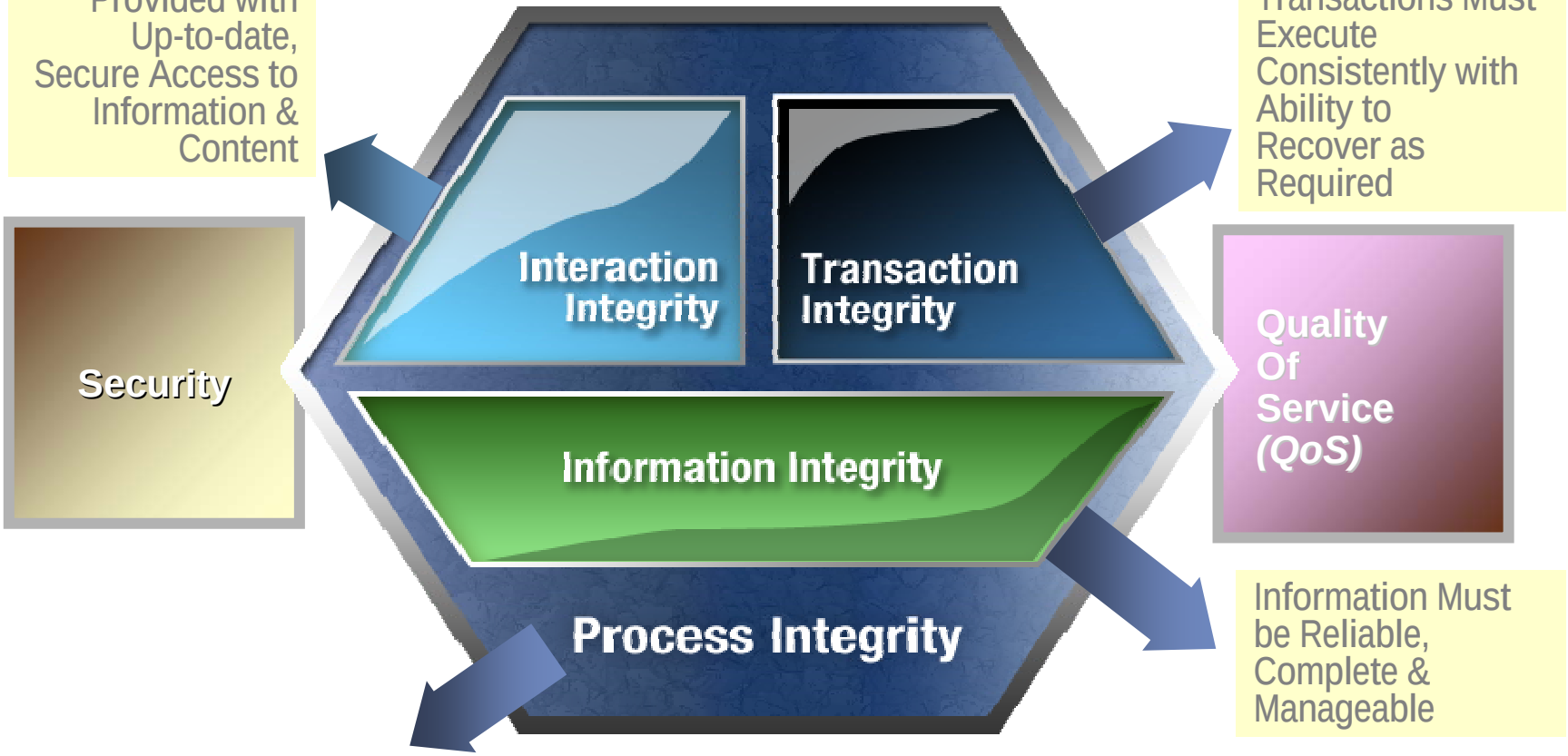
SOFTWARE STRATEGIES

Smart SOA Process Integrity

Next Level Of SOA – Perfect System z Match

Ensuring Integrity of Transactions, Interactions & Information

Users Must Be Provided with Up-to-date, Secure Access to Information & Content



Transactions Must Execute Consistently with Ability to Recover as Required

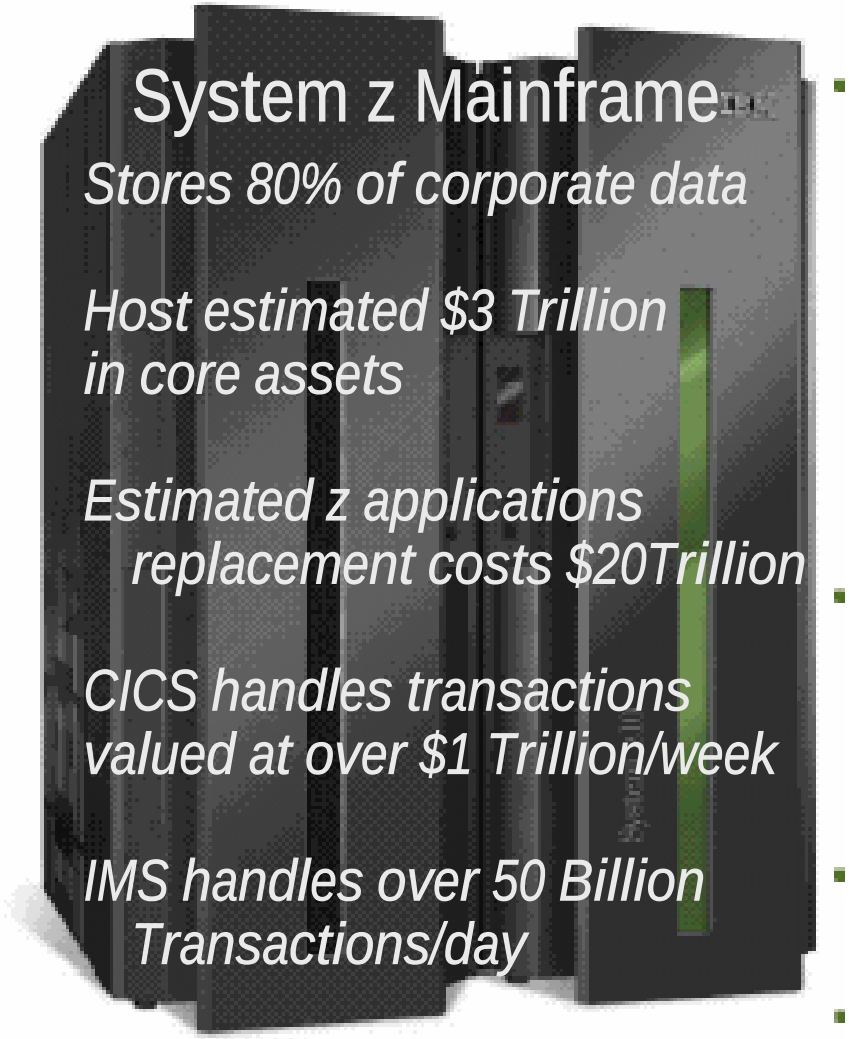
Information Must be Reliable, Complete & Manageable

Process Integrity = Ability to conduct reliable business activity in a secure, scalable SOA environment with seamless synchronization between:

■ Services ■ Human Tasks ■ Information ■ Domains ■ Users

Create New Value From System z Assets

IBM Smart SOA + System z Better Solution!



Build SOA Round Core z Applications

Most highly virtualized & energy efficient:

- *Driving out cost & complexity*

Strongest security & resiliency:

- *Minimizes risks & downtime*

Centralized enterprise data serving & IOD:

- *Great business analytics platform*

Strongest foundation for enterprise SOA:

- *IT that responds to the business*

A now-flourishing mainframe ecosystem:

- *ISVs and academic initiatives*

Source: IBM 2008

Smart SOA On System z

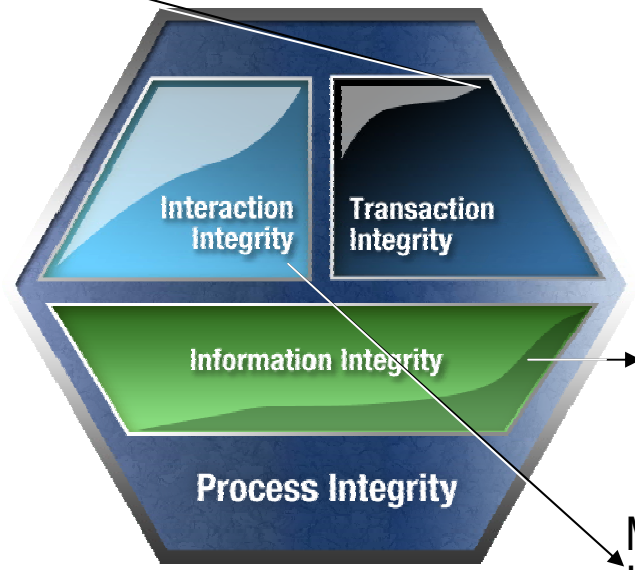
Advanced Products Supporting in 2008

Main Transaction Integrity Products:

- IBM WebSphere Process Server
- IBM WebSphere ESB
- IBM WebSphere Application Server
- IBM WebSphere Message Broker
- IBM WebSphere Service Registry & Repository
- WebSphere DataPower Integration Appliance XI50
- IBM WebSphere MQ
- IBM WebSphere Adapters
- IBM CICS Transaction Server

Main SOA Quality of Service Products *(See SMCz):*

- Tivoli Composite Application Managers
- WebSphere Application Server
- WebSphere eXtreme Scale
- WebSphere Virtual Enterprise
- WebSphere DataPower SOA Appliances
- Rational Performance Tester Extension for SOA Quality *(+ others)*
- IBM System z servers



Main Information Integrity *(See IOD)* Products:

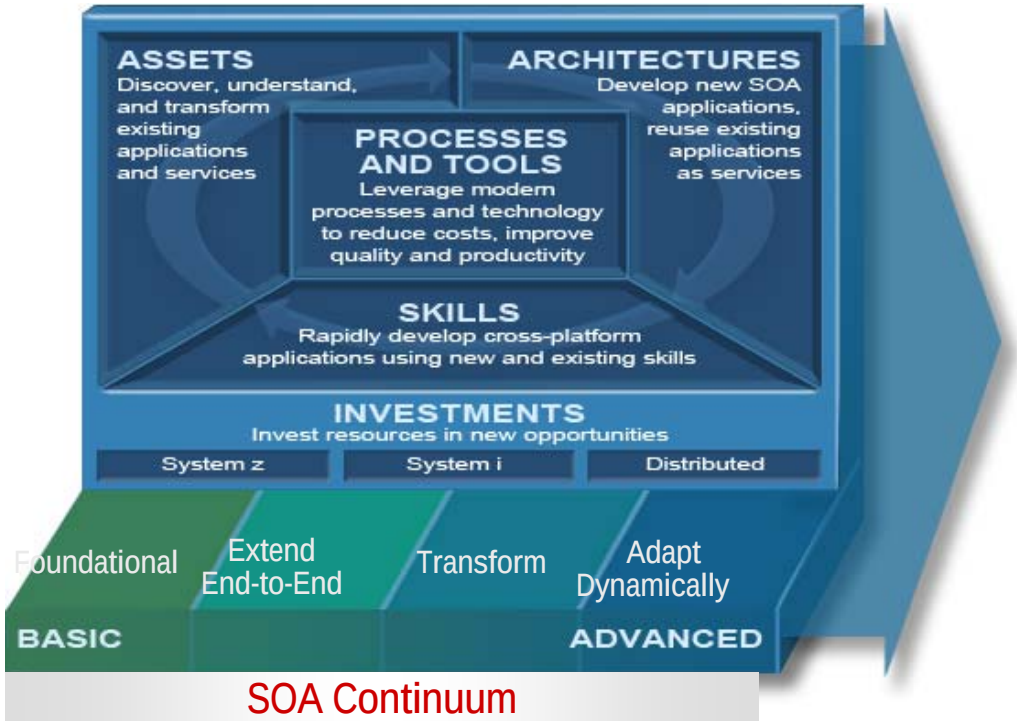
- IBM Cognos 8 BI/EPM platform
- IBM Information Server
- IBM InfoSphere Master
- Data Management Server
- IBM Content Manager
- IBM FileNet P8
- IBM DB2 “Viper V9.0” inc. DB2 Warehouse function
- IBM IMS V10
- IBM DB2 & IMS z/OS tools *(49 & 46 of these)*
- IBM Data Studio

Main Interaction Integrity Products:

- IBM WebSphere Portal Server
- IBM WebSphere Portlet Factory
- IBM Lotus Forms
- IBM Lotus Expeditor

App. Devt. & Enterprise Modernization

for Smart SOA on System z



SOA Continuum

- ✓ *Extend value of existing System z assets*
- ✓ *Leverage, modernize existing & new skills*
- ✓ *Drive innovation with technology advancements*
- ✓ *Improve team collaboration & responsiveness*
- ✓ *Add business flexibility & change over SW lifecycle*

Rational Business Developer V7.1
Rational Developer for System z V7.1
Leverage "EGL" to accelerate Web 2.0 & SOA development on System z; increase productivity and skills flexibility.

Rational Transformation Workbench
Rational Host Access Transformation Services
Analyze, extend and reuse core System z transactions as services; reduce time to market and increase responsiveness; Modernize assets for SOA transformation.

Rational ClearCase for z/OS &
Rational Build Forge
Speed software delivery and improve quality by automating and streamlining software lifecycle management processes for System z; leverage a common software repository across organizational development projects.

IBM Mashup Center
IBM WebSphere sMash
IBM Web 2.0-SOA client development tools for end users & professional developers.

SOFTWARE STRATEGIES

Information On Demand

Unlocking Business Value of Information

IBM IOD Offerings

Industry Models, Blueprints & Frameworks

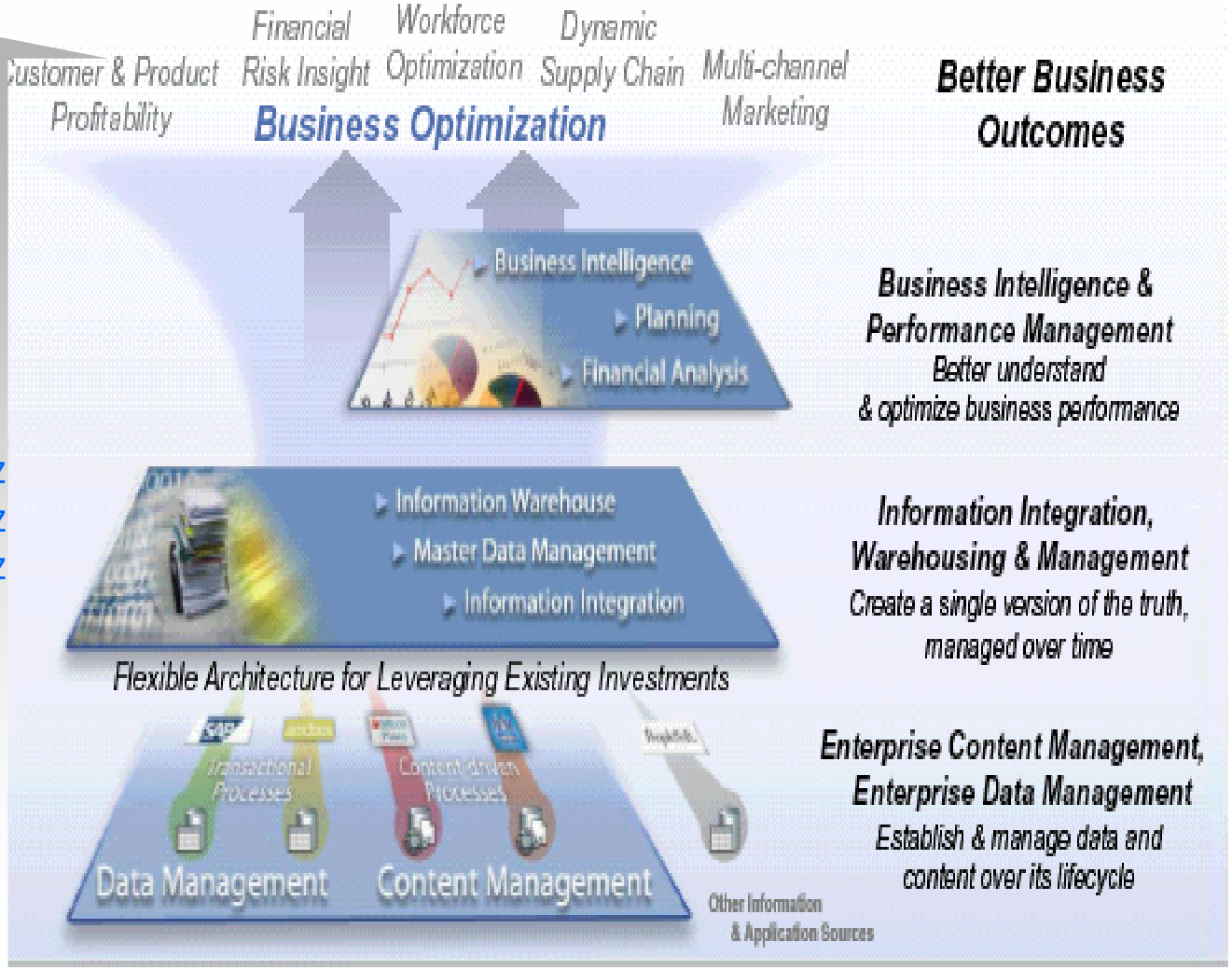
IBM Cognos 8 BI on z
IBM Cognos 8 Planning
IBM Cognos TM1

IBM DB2 Data Warehouse on z
IBM InfoSphere MDM Server on z
IBM Information Server on z

End-to-End Capabilities

DB2 "Viper" for z/OS V9
IMS V10
IBM Content Manager
IBM FileNet P8 *(Distrib. only)*

IBM IOD Vertical Industry & Technology Services



IBM Tivoli Service Management Center for System z

Empowers customers to strategically use System z as the integrated, enterprise-wide hub that efficiently manage all business & IT services

IBM Tivoli Service Management Center for System z (SMCz)

SMCz Benefits:

Central management point	= Less management time/effort
Increases resource utilization	& Fewer resources to manage
Fewer servers	= Less energy, cooling, & space
Fewer intrusion points	= Tighter security
Fewer points of failure	= Higher availability

SMCz-Supportive Products Already Available:

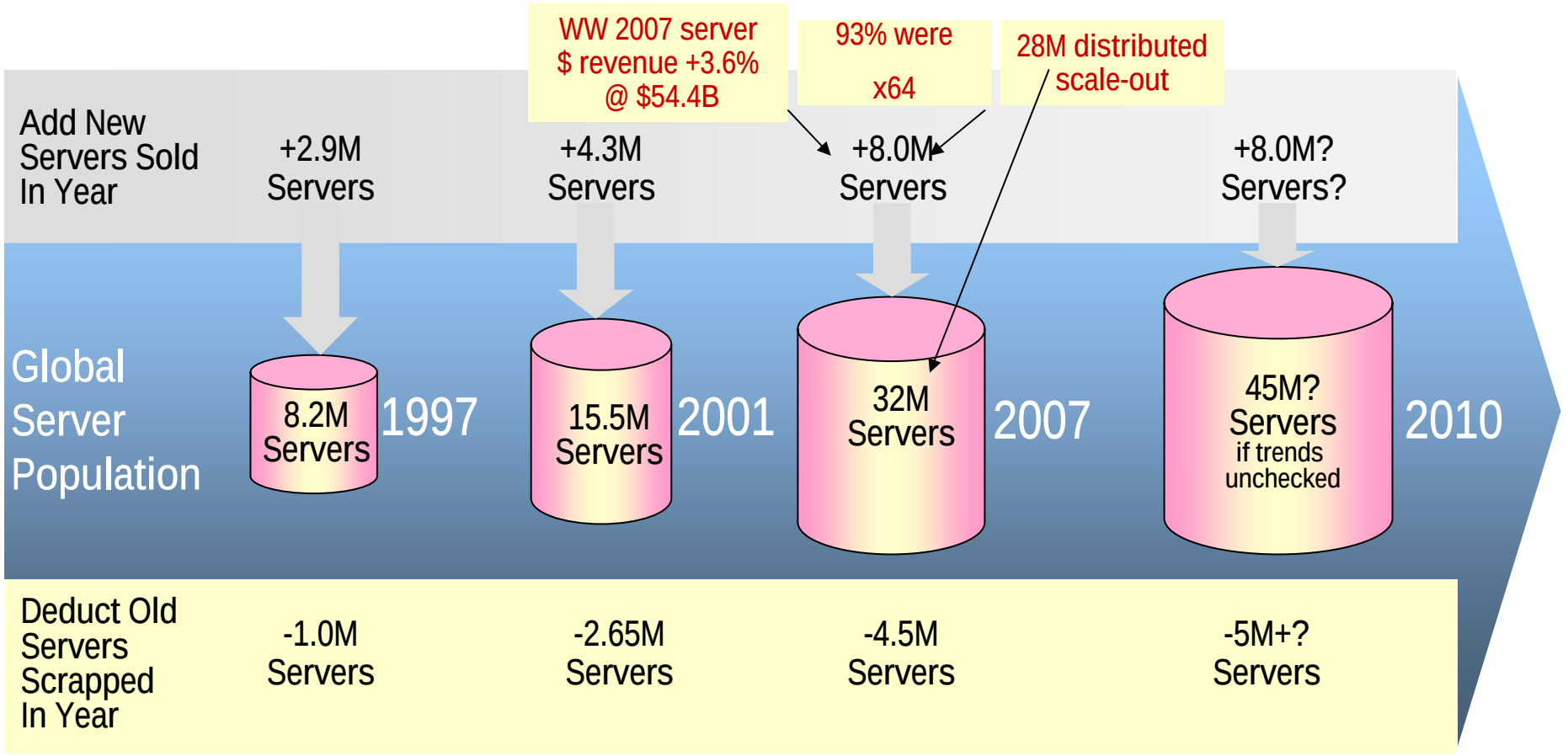
- IBM Tivoli Application Discovery & Dependency Manager
- IBM Tivoli OMEGAMON XE on z/OS
- IBM Tivoli Composite Application Manager
- IBM Tivoli System Automation
- IBM Tivoli NetView for z/OS
- IBM Tivoli Workload Automation
- IBM Tivoli Accounting & Usage Manager
- IBM Tivoli Identity Manager
- IBM Tivoli zSecure Suite

Our Assessment Of These?
Extraordinary Software Capabilities/Advances

- Analyst did 3 new White Papers on all 4 System z SW areas
  - *Deep-dive looks, 175 pages total! Out soon, free, via IBM. We found:*
- Industry-leading, world-class, innovative new IBM software in each area on System z. Many $B of IBM investment for years, to attain.
- Major advances in IBM Q2-2008-on System z SW portfolio:
  - *Delivers superb solutions for today's IT/CIO challenges/needs*
  - *Best-ever IBM System z SW portfolio strength in 44-year history!*
  - *Superior IBM z SW capabilities vs. other system platforms (UNIX, Wintel,..) and vs. other vendors offerings (Sun, HP, Oracle, SAP, Microsoft)*
  - *Fully exploits spectacular, new System z10 mainframe hardware uniques*
    - *Eg. zIIP & zAAP specialty engines, z10 MPU performance, QoS, RAS, etc.*
  - *Enables extensive reuse of priceless mainframe software/data assets*
- Delivers modern/advanced applications styles on/from System z
  - *SOA composite applications, BPM-based applications, Web 2.0 applications*
- Certain these SW advances will drive even faster growth for System z

World Server Population Explosion

Distributed Servers ⏱ Nightmare IT Costs Rise

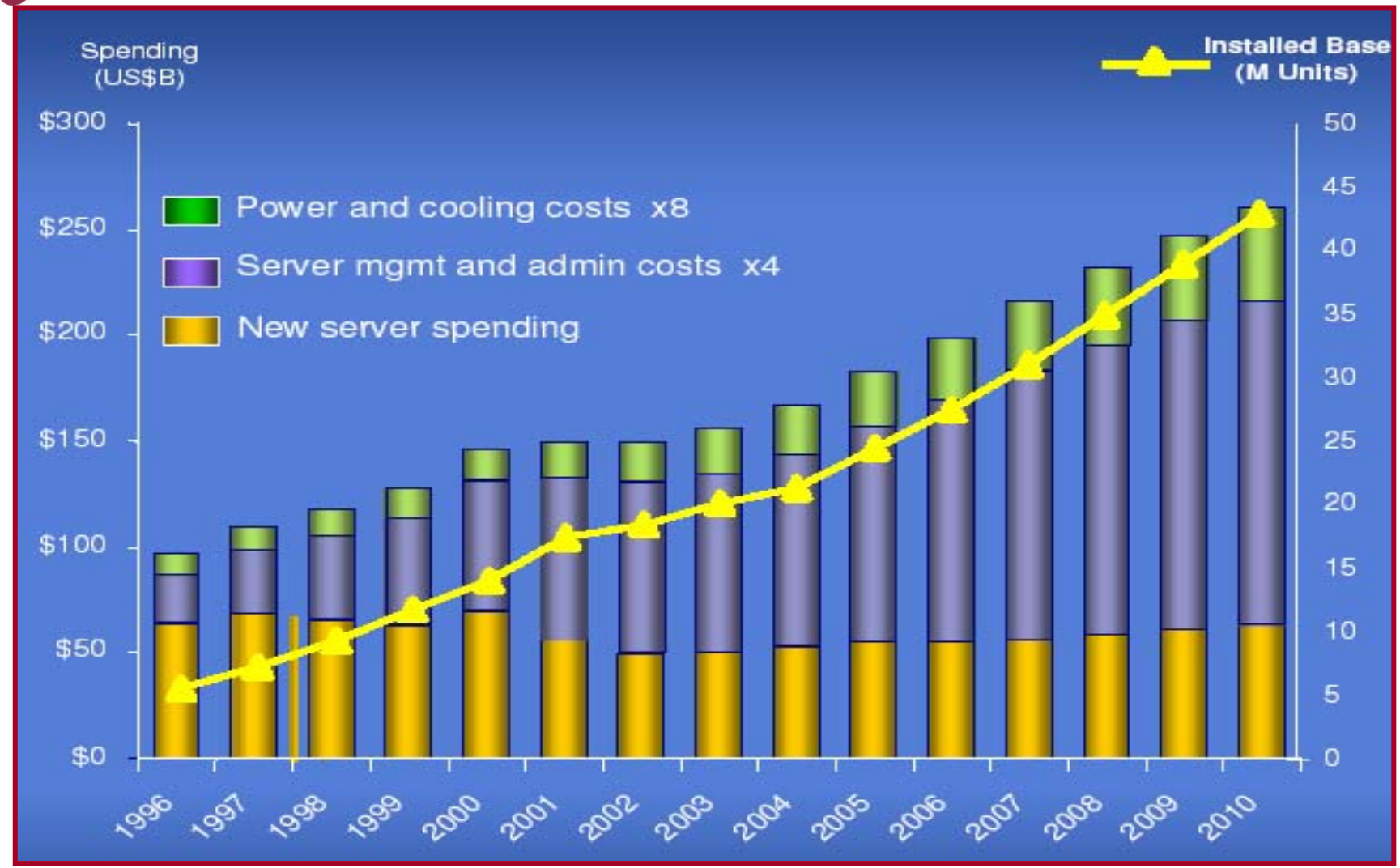


This explosion of server number (distributed scale-out the culprit) caused.....

SOFTWARE STRATEGIES

Long-Term Systems Market Perspective

of Servers, Support & Power Costs, All Too High



Source IDC 2007

Scale-Out Distributed Computing
= Economic Catastrophe for Users

- Distributed servers in use exploded ☙ c. 28M running @end '07
  - *x86/x64 & RISC-UNIX scale-out volume servers. c. 48M sold '95-'07*
- Pushed IT system management costs up 6X to vast $120B *(07)*
  - *+ IT system power/cooling costs soared to $22B (07)*
  - *+ Combined, these were near-3X 2007 new server spending*
- Extreme inefficiency, unspeakably wasteful of staffing, software, hardware, power, space. Environmentally appalling:
  - *High staffing costs. 1 staffer/20-25 distributed servers*
  - *90-95% software costs wasted when utilization averages 5-10%*
  - *90-95% server hardware capacity wasted " " ".*
  - *Huge electrical power/cooling costs, extravagant data center space*
- ~~Economic, manageability,environmental catastrophe~~ for users

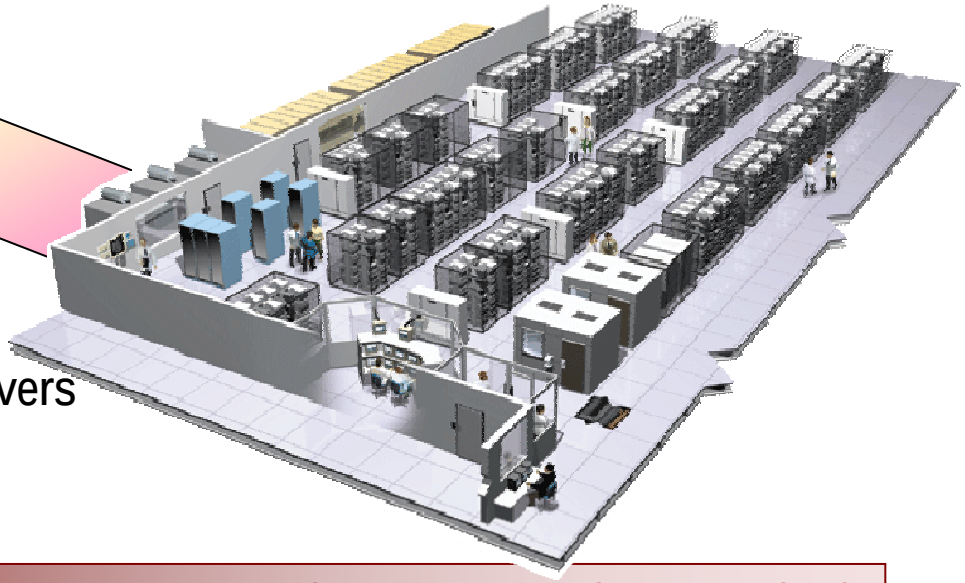
System z "Datacenter in a Box"

Escape From Distributed Systems Nightmare

System z Mainframe Offers:

- Hundreds of processors-all types
- Extremely large I/O bandwidth
- Built-in internal networking
- "Shared everything" resource model
- $B engineering & software development
- A pre-integrated data center in one box
- Highest availability, security
- Lowest total, staffing, software, space, power, & cooling cost of ownership

Using extreme virtualization with Linux-on-z/VM



Distributed Systems Suffer From:

- Highest costs, & highest complexity
- Masses of servers,storage, network gear
- Low hardware/ software utlization
- Data silos & synchronization issues
- Highest & linear staffing costs with no. servers
- Frequent outages
- Severe security issues &, costs
- Highest space, power & cooling costs

SOFTWARE STRATEGIES

Real Case – System z vs. Existing or New x64 Distributed – Financials

Alternatives Considered → TCIO Cost Categories ↓	A			B			C	
	Existing	% of A	5 Year	New	% of B	5 Year	New x64	% of B
	Distributed	5 Year	Savings	System z	5 Year	Savings	VMware	5 Year

Real customer - global process industry - financial analysis - pre z10

Consolidate 2,339 existing distributed servers, onto 5 z9 EC
5-Year TCO saving $114M, or 52%……. Stunningly high savings

Also compared 5- z9 solution vs. all-new x86 VMware solution
5-Year TCO saving $32M, or 23%……. Still major savings

Even these huge savings much higher using new z10 EC
c. 35% better z10 price/performance directly adds
Would only need 3 z10 ECs

System z 2008 Outlook

Our Conclusions, Recommendations

- System z10 & really dramatic capacity, capability, & TCO advance
- We expect z10 will drive stronger mainframe growth worldwide:
  - *New workloads: SOA adoption, IOD adoption, x64 consolidation on Linux, etc. main 2008 drivers, etc.*
  - *New customers in new geographies (BRIC etc.), in new industries (gaming, telecom, etc,), from new hybrid system combos (z + Cell), & the 10,000 existing customers.*
- HP & Sun losing shares & user bases for higher-end SMPs. MPUs & systems un-competitive with IBM z & p
- Superb & best-ever, world-class new IBM z Software 2008 stack:
  - *Smart SOA, AD & Modernization tools, IOD , & SMCz management, run from System z to serve whole enterprise infrastructure*
- System z Linux-on-z/VM scale-out server consolidation a huge win:
  - *Suitable 30-50% x64/UNIX servers. $10M-$100M savings for large users!*
- Invest in z with highest confidence:
  - *in new z10s,& especially in new IBM software to implement SOA, IOD, SMCz!*

Outside Analyst View

Thank You

Software Strategies
Ian Bramley

IBM System z SW Premier Event,
Valencia, Spain, May 6 2008

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