

# Work Smarter In A Dynamic Environment with Power Systems



## World's Easiest Quiz

Passing requires only 4 correct answers...a mere 40%

1. How long did the Hundred Years War last?
2. Which country makes Panama hats?
3. From which animal do we get catgut?
4. In which month do Russians celebrate the October Revolution?
5. What is a camel's hair brush made of?
6. The Canary Islands in the Atlantic is named after what animal?
7. What was King George VI's first name?
8. What color is a purple finch?
9. Where are Chinese gooseberries from?
10. What is the color of the black box in a commercial airplane?

## World's Easiest Quiz

Passing requires only 4 correct answers...a mere 40%

1. How long did the Hundred Years War last? **118 years**
2. Which country makes Panama hats? **Ecuador**
3. From which animal do we get catgut? **Goat & Sheep**
4. In which month do Russians celebrate the October Revolution? **November 1**
5. What is a camel's hair brush made of? **Squirrel Fur**
6. The Canary Islands in the Atlantic is named after what animal? **Dogs**
7. What was King George VI's first name? **Albert**
8. What color is a purple finch? **Crimson**
9. Where are Chinese gooseberries from? **New Zealand**
10. What is the color of the black box in a commercial airplane?  
**Orange, of course**

**How did you do?**

# As The World Gets Smarter, Demands On IT Will Grow



Smart supply chains



Intelligent oil field technologies



Smart food systems



Smart healthcare



Smart energy grids



Smart retail

**1 Trillion**

Devices will be connected to the internet by 2011

**25 Billion**

Global trading systems are under extreme stress, handling billions of market data messages each day

**10x**

Digital data is projected to grow tenfold from 2007 to 2011.

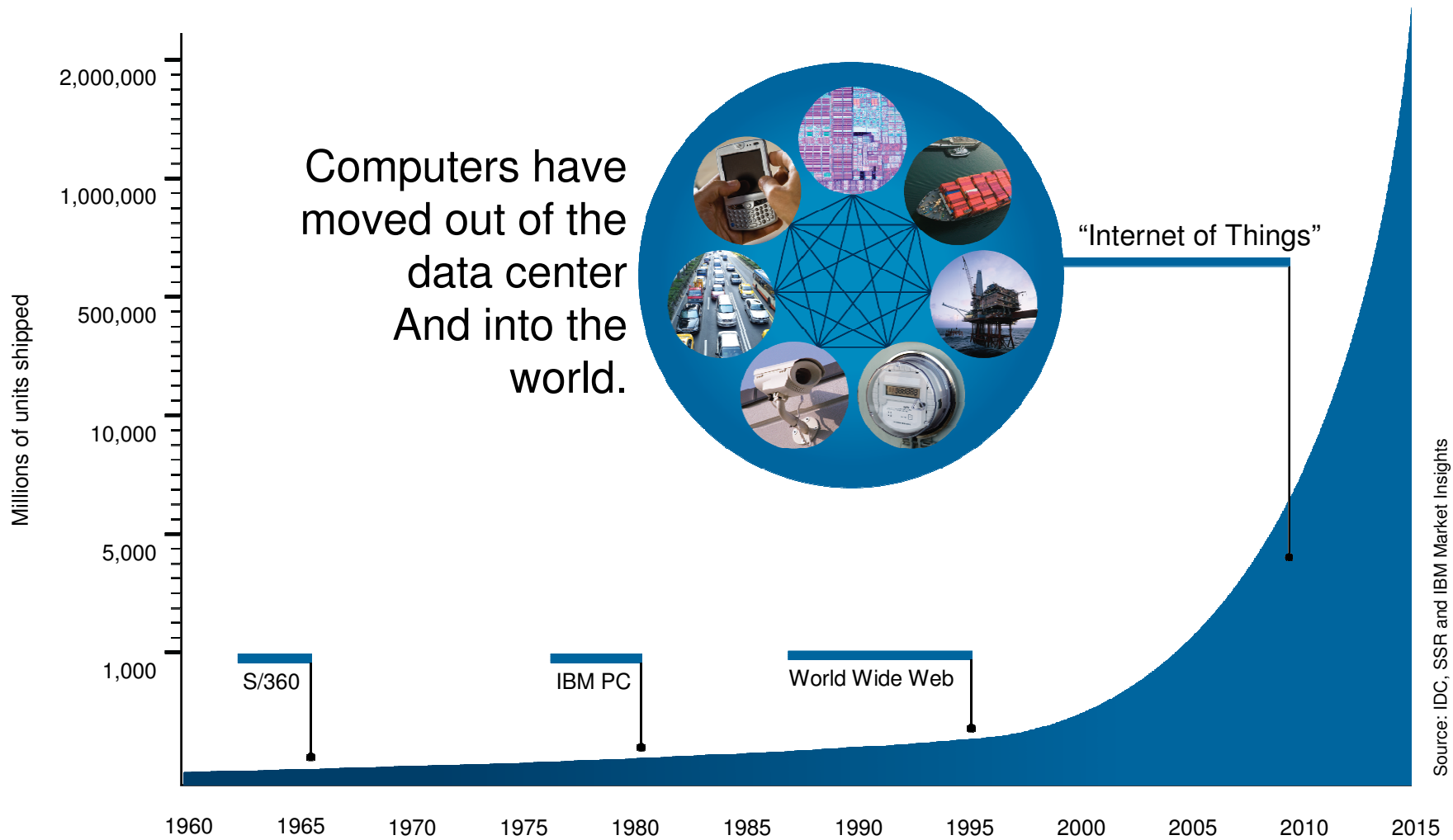
**70? per \$1**

70% on average is spent on maintaining current IT infrastructure versus adding new capabilities

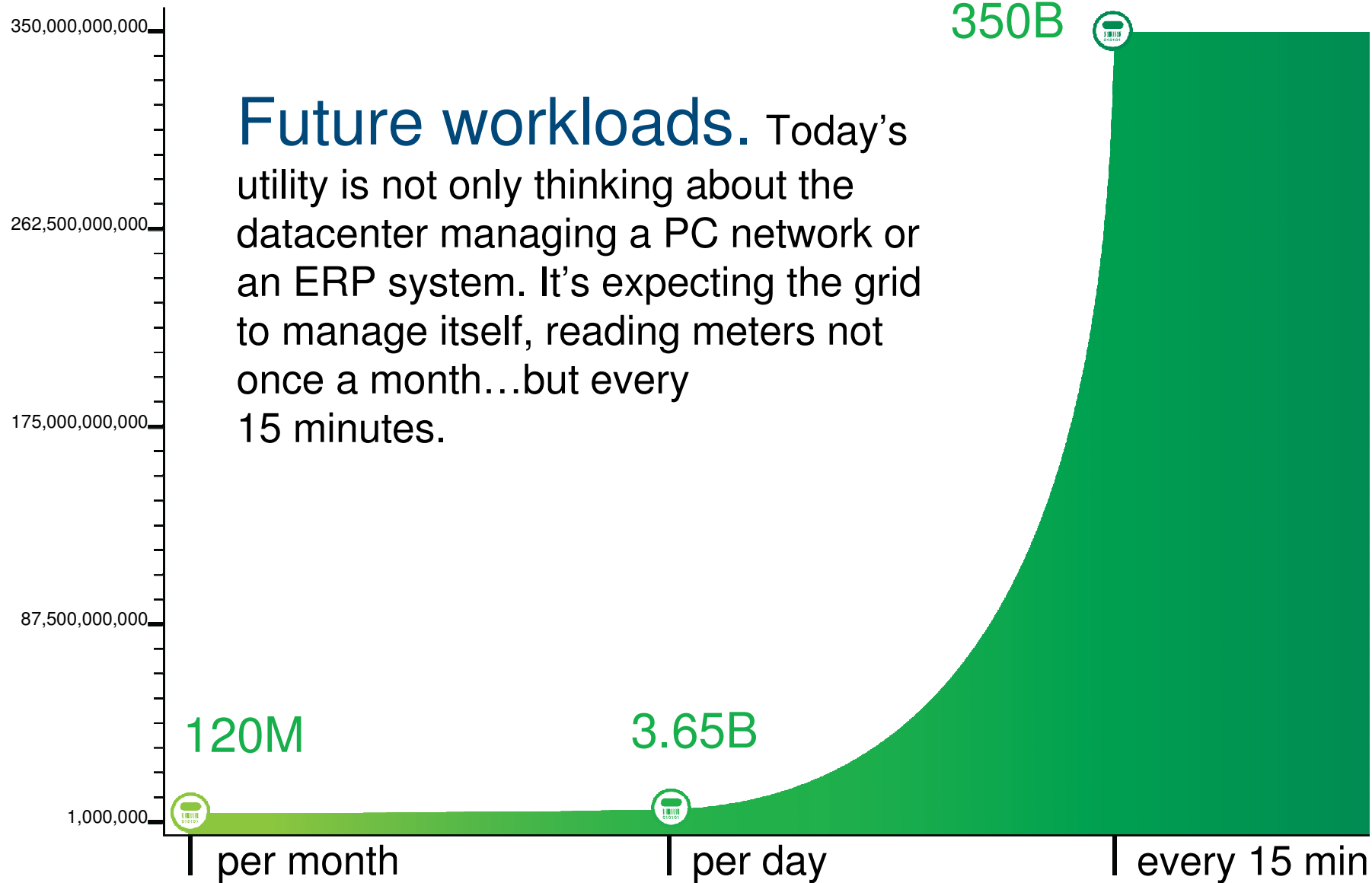
**IT infrastructure must grow to meet these demands  
global scope, processing scale, efficiency**

Power your planet.

# Welcome to the decade of Smart.



Transactions per year



**Future workloads.** Today's utility is not only thinking about the datacenter managing a PC network or an ERP system. It's expecting the grid to manage itself, reading meters not once a month...but every 15 minutes.

# Rising costs and complexity threaten profits and competitiveness

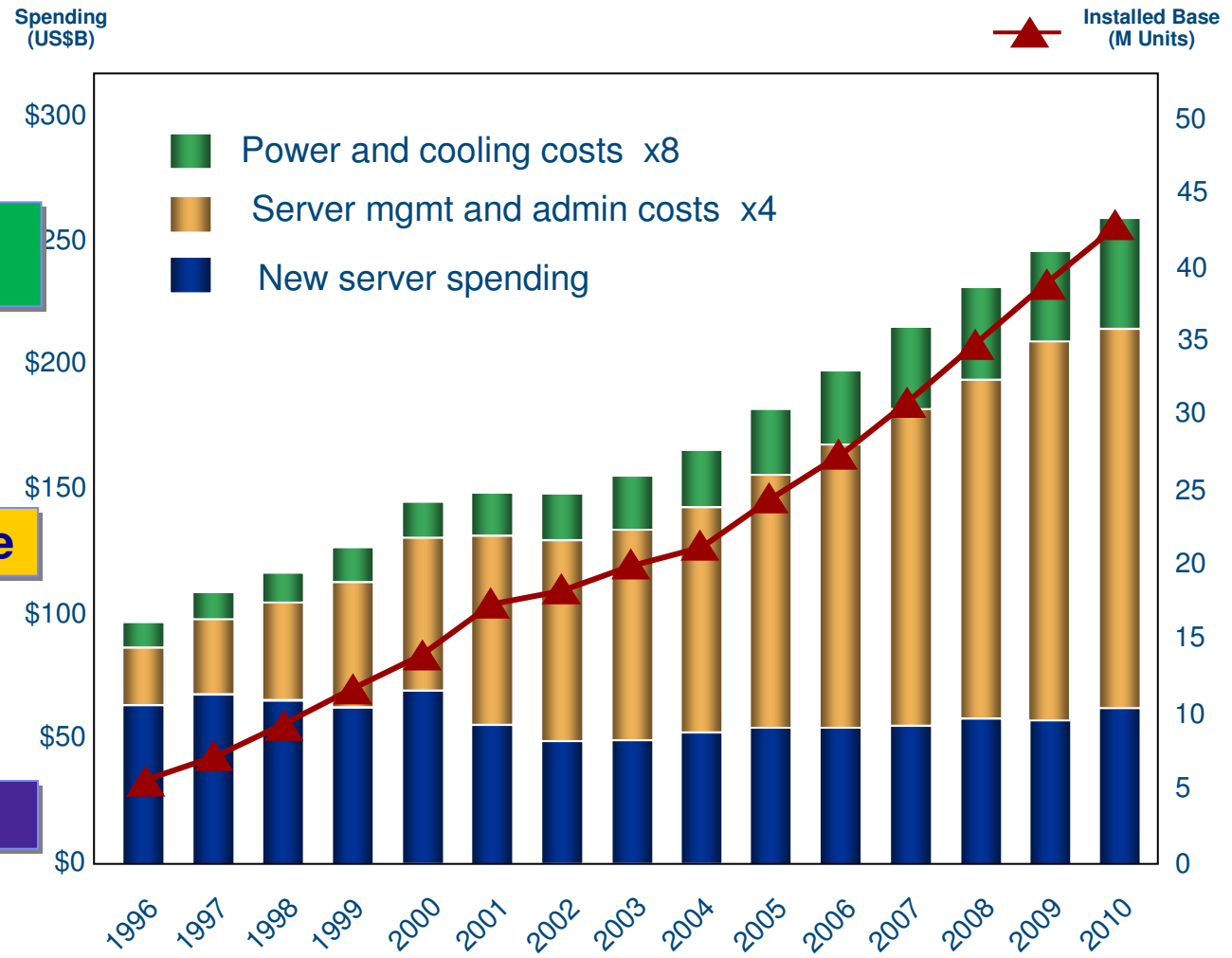
## Cost Structure

Energy expense approaches new server spending

Standardization & Automation

Growing OPEX expense

Virtualization & Consolidation  
Steady CAPEX expense

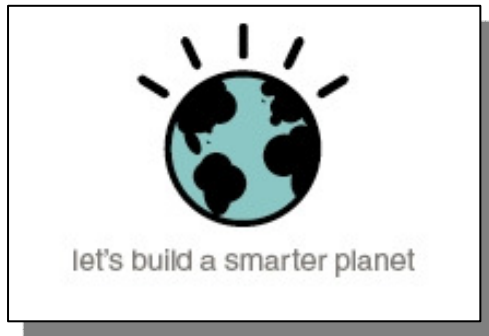


Power your planet.

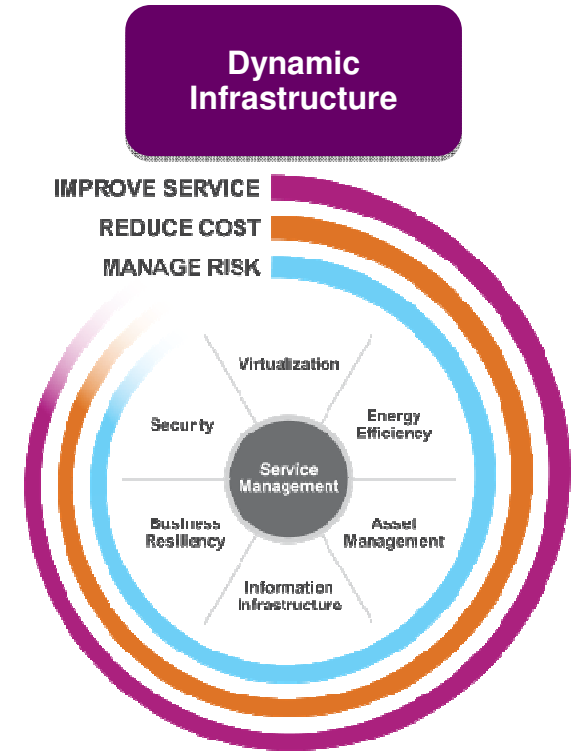
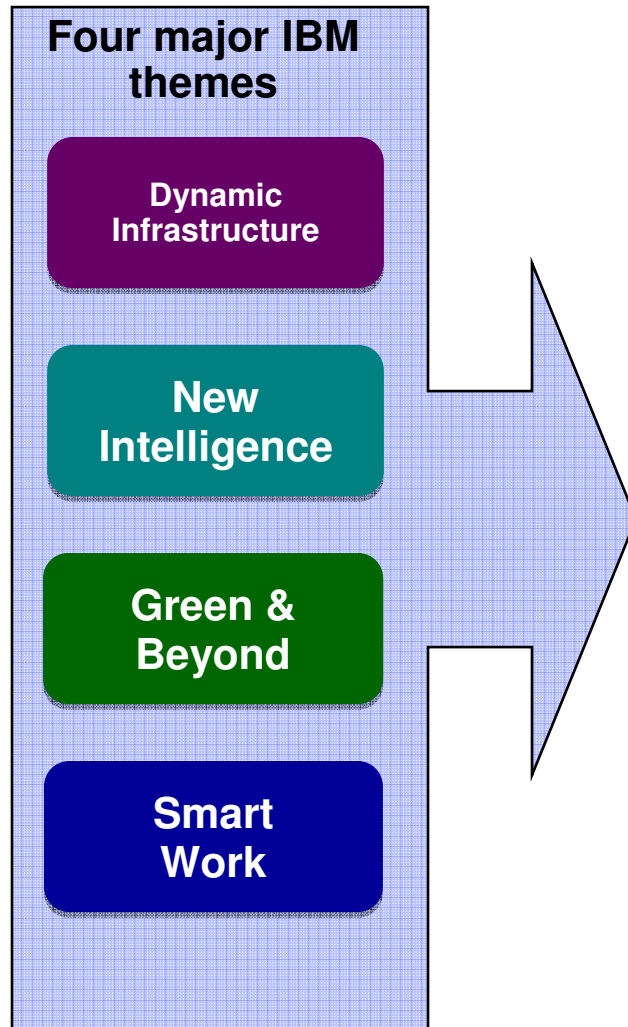
SOURCE: IDC, 'Worldwide Server Power and Cooling Expense 2006-2010,' Document #203598, Sept. 2006  
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# Building a Smarter Planet – Dynamic Infrastructure

## IBM's smarter planet vision



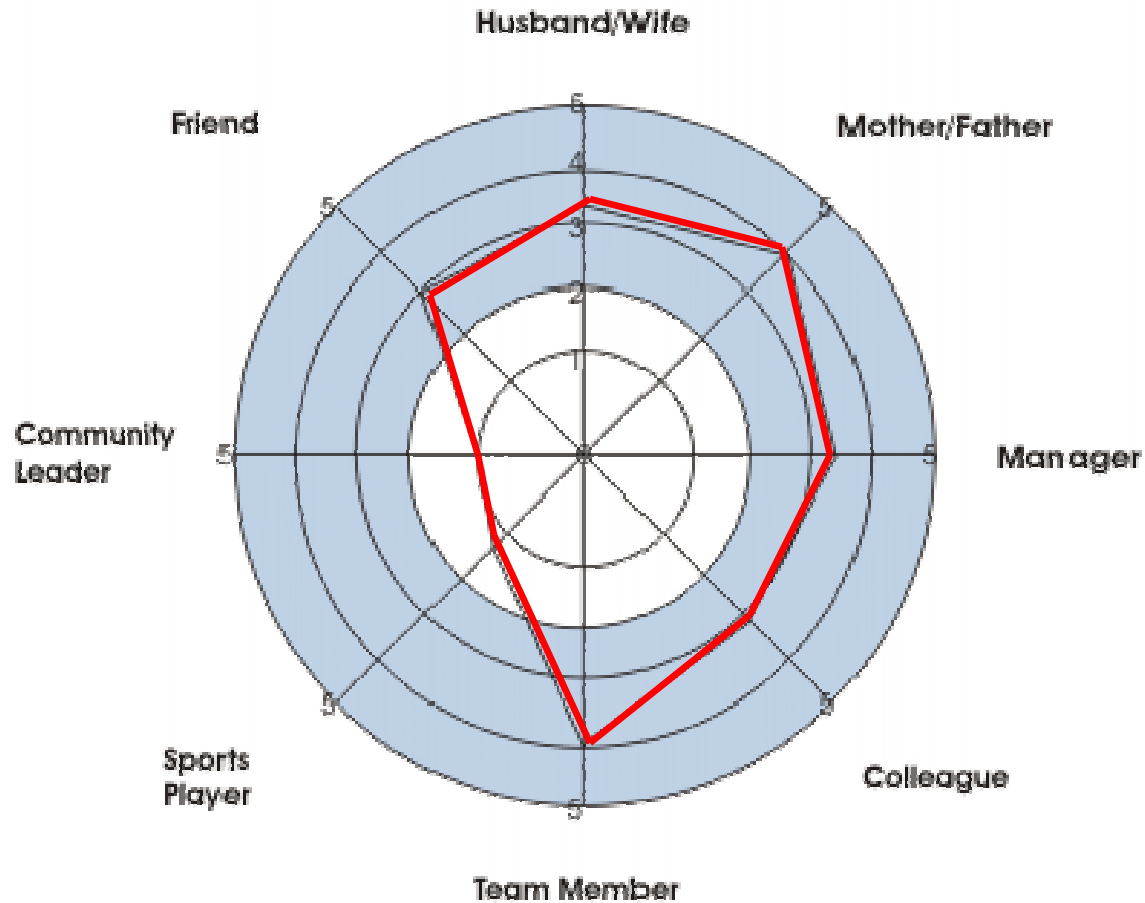
*The world has become flatter and smaller. Now it must become smarter.*



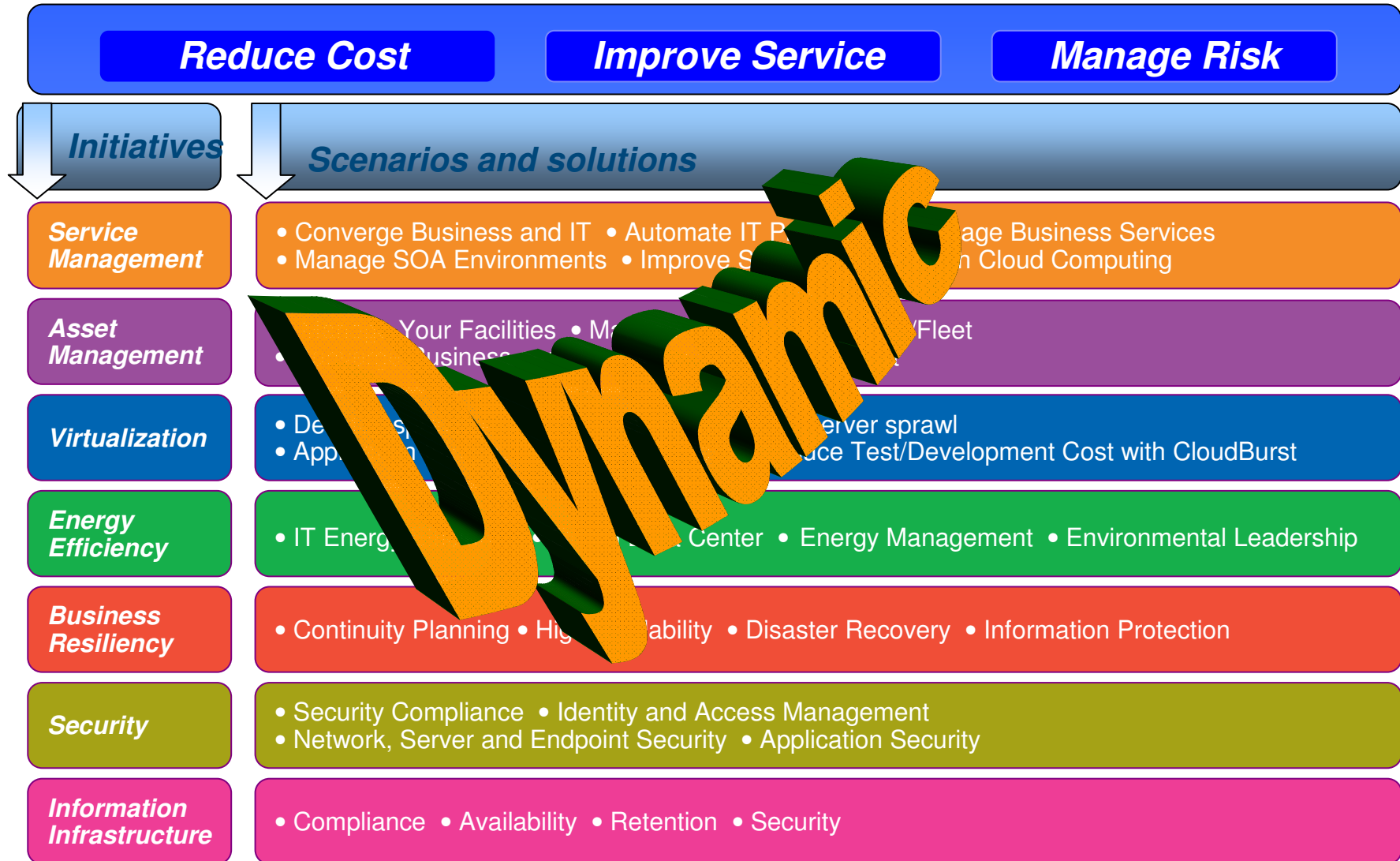
*How do I create an infrastructure that drives down cost, is intelligent and secure, and is just as dynamic as today's business climate ?*



# Wheel of Life



# The IBM Dynamic Infrastructure



**Dynamic**

# Focus on Innovation

Processors

RAS

Virtualization

Security

Power Efficiency

**z/OS**



**IBM  
Research**



**System z**

**Power Systems**

**System x**

**BladeCenter**

**Storage**

**IBM  
Technology  
Leadership**



Power your planet.

# IBM Power Systems



System i

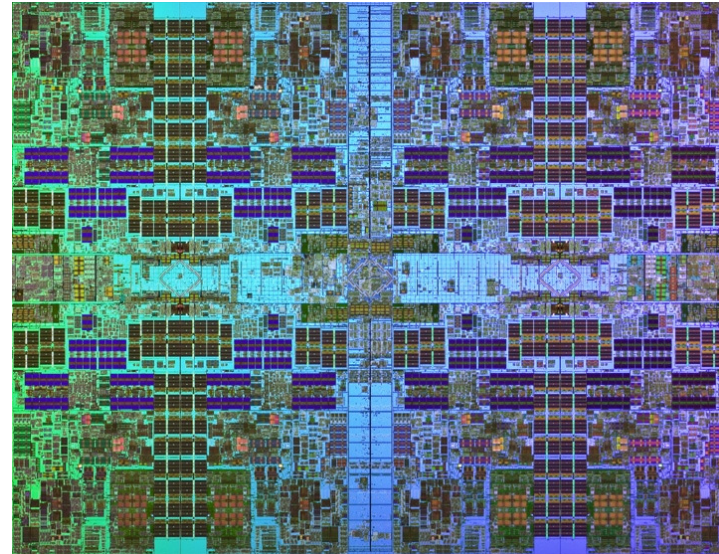


System p



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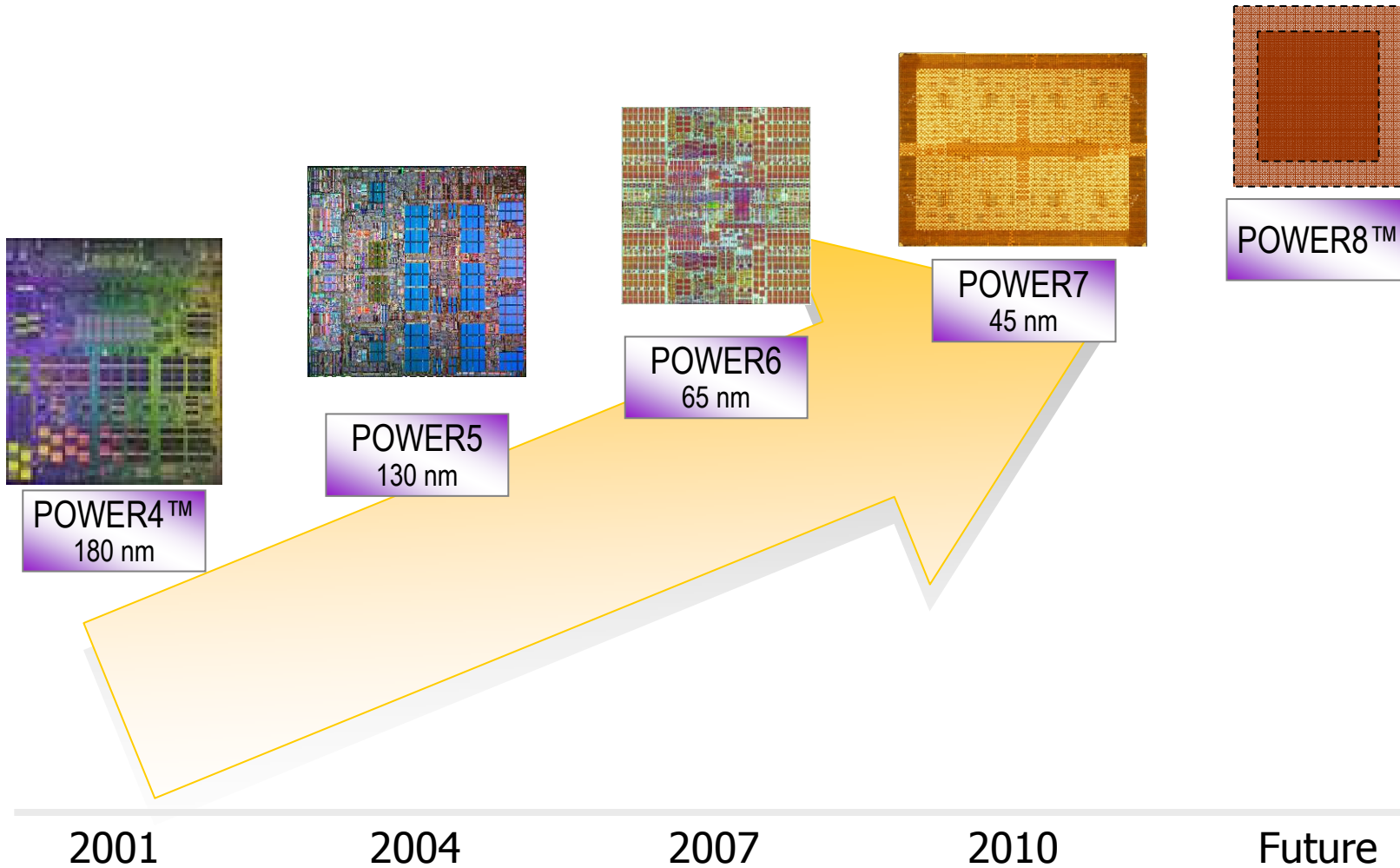
## Technology leadership



- ✓ 4, 6 or 8 cores per socket
- ✓ 3.0 to 4.14 GHz
- ✓ Up to 4 threads per core
- ✓ Integrated eDRAM L3 Cache
- ✓ Dynamic Energy Optimization

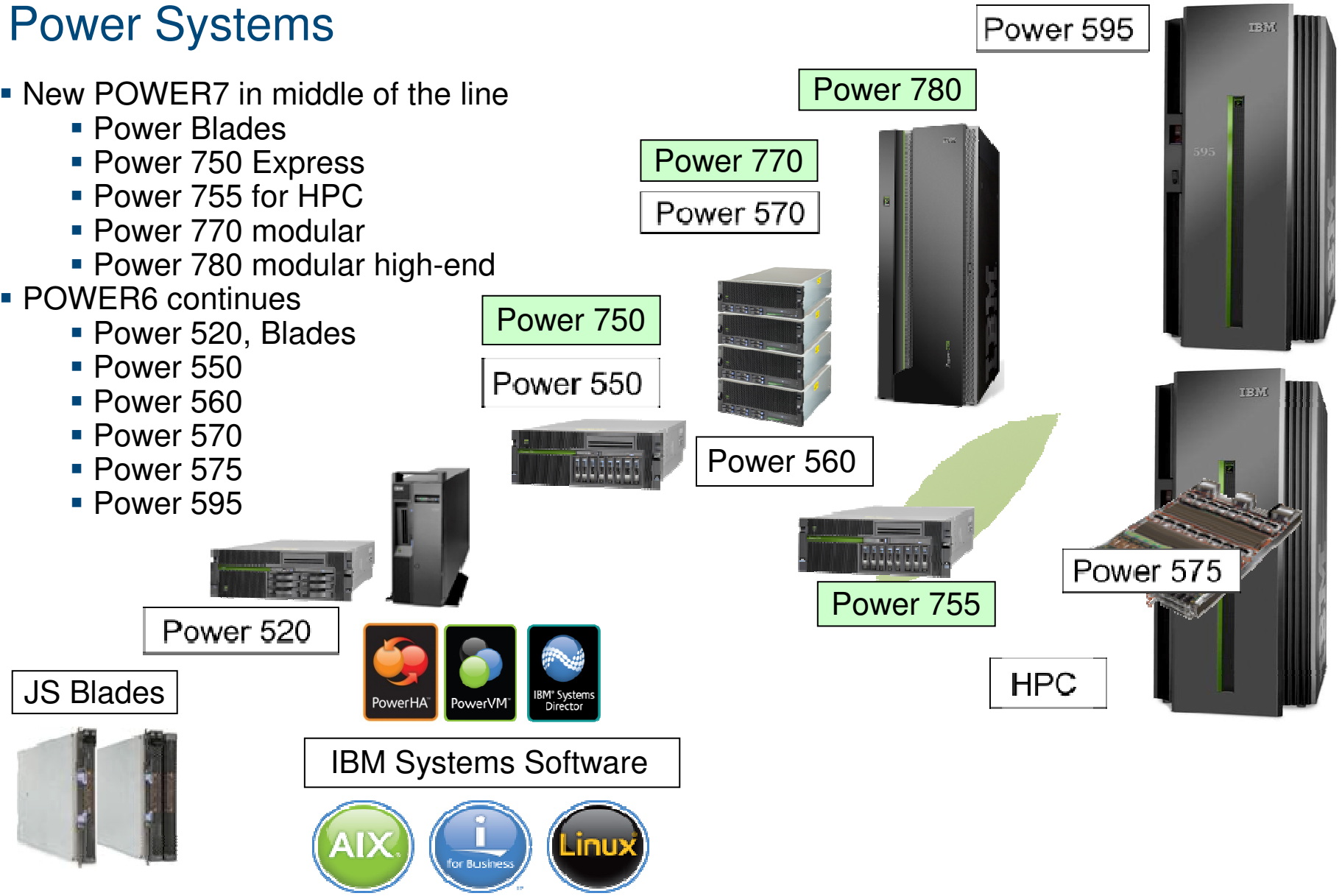
# Processor Technology

## *IBM Investment in the Power Franchise*



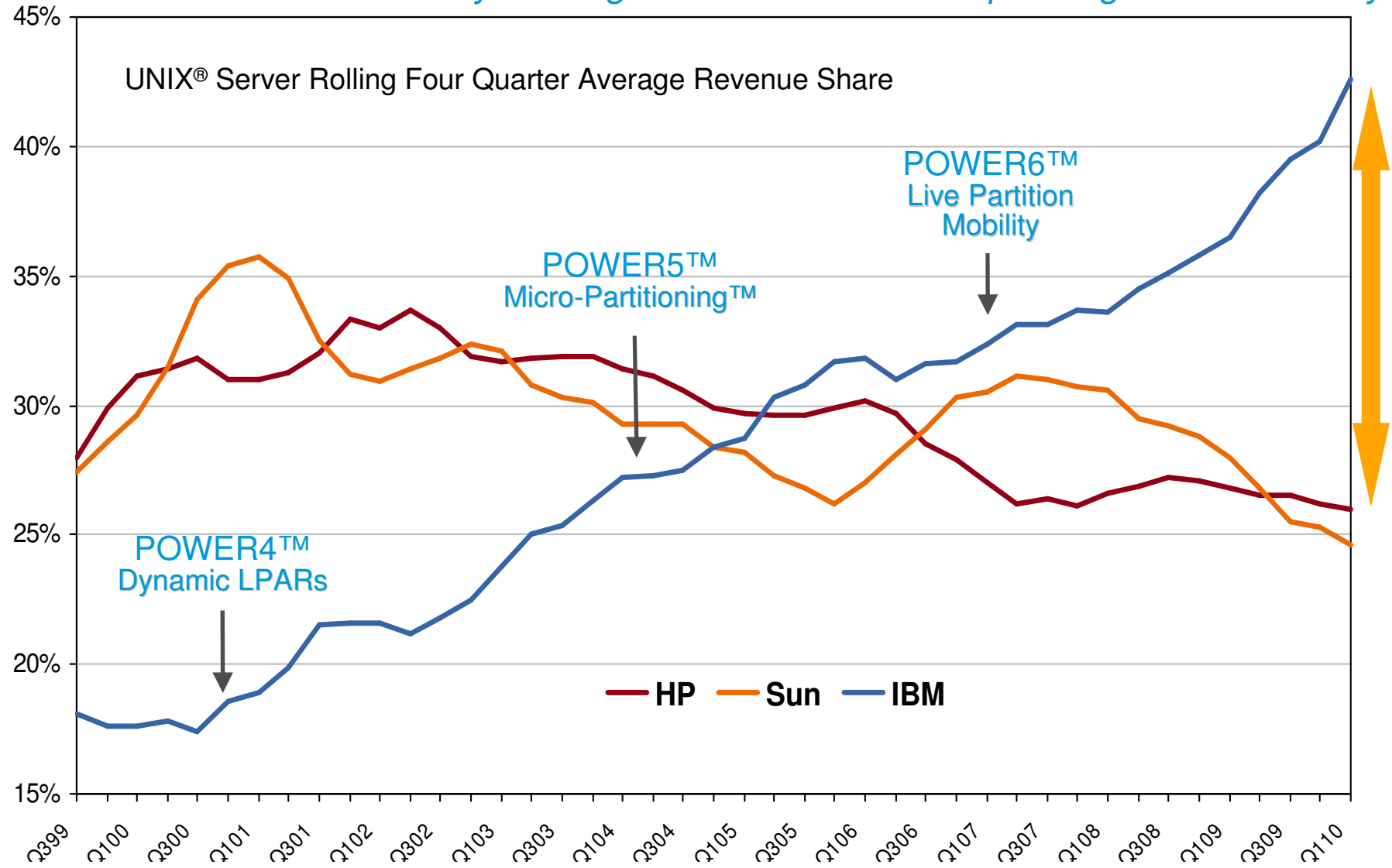
# Power Systems

- New POWER7 in middle of the line
  - Power Blades
  - Power 750 Express
  - Power 755 for HPC
  - Power 770 modular
  - Power 780 modular high-end
- POWER6 continues
  - Power 520, Blades
  - Power 550
  - Power 560
  - Power 570
  - Power 575
  - Power 595



# Customers are moving to higher value

...as shown by the largest shift of customer spending in UNIX History





# Power your planet.



### Workload-Optimizing Systems



**AIX - the future of UNIX**  
**Total integration with i**  
**Scalable Linux ready for x86 consolidation**



### Virtualization without Limits

- ✓ Drive over 90% utilization
- ✓ Dynamically scale per demand



### Dynamic Energy Optimization

- ✓ 70-90% energy cost reduction
- ✓ EnergyScale™ technologies



### Resiliency without Downtime

- ✓ Roadmap to continuous availability
- ✓ High availability systems & scaling

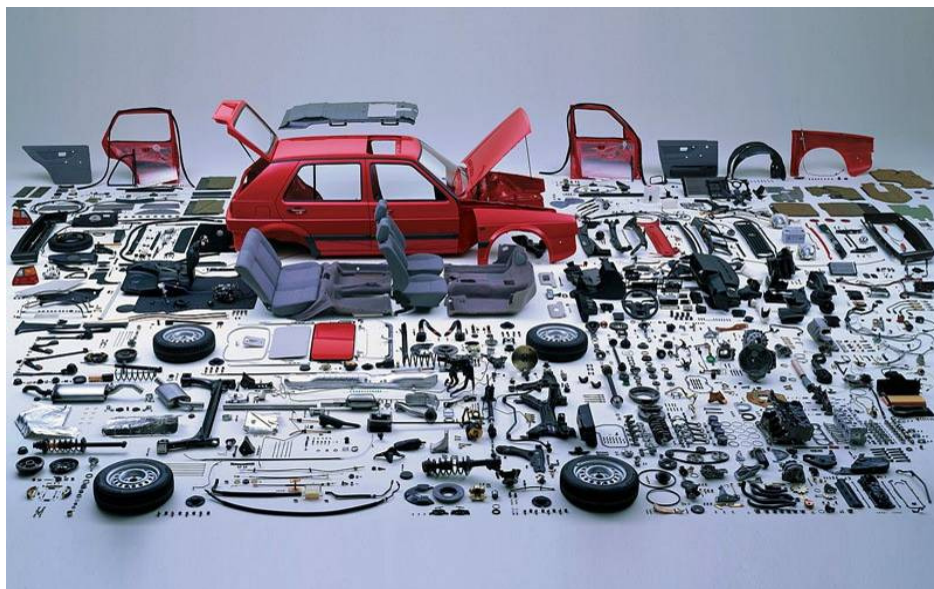


### Management with Automation

- ✓ VMControl to manage virtualization
- ✓ Automation to reduce task time

## Smarter Systems for a Smarter Planet.

# The Power Systems Advantage



- **X86 approach:**

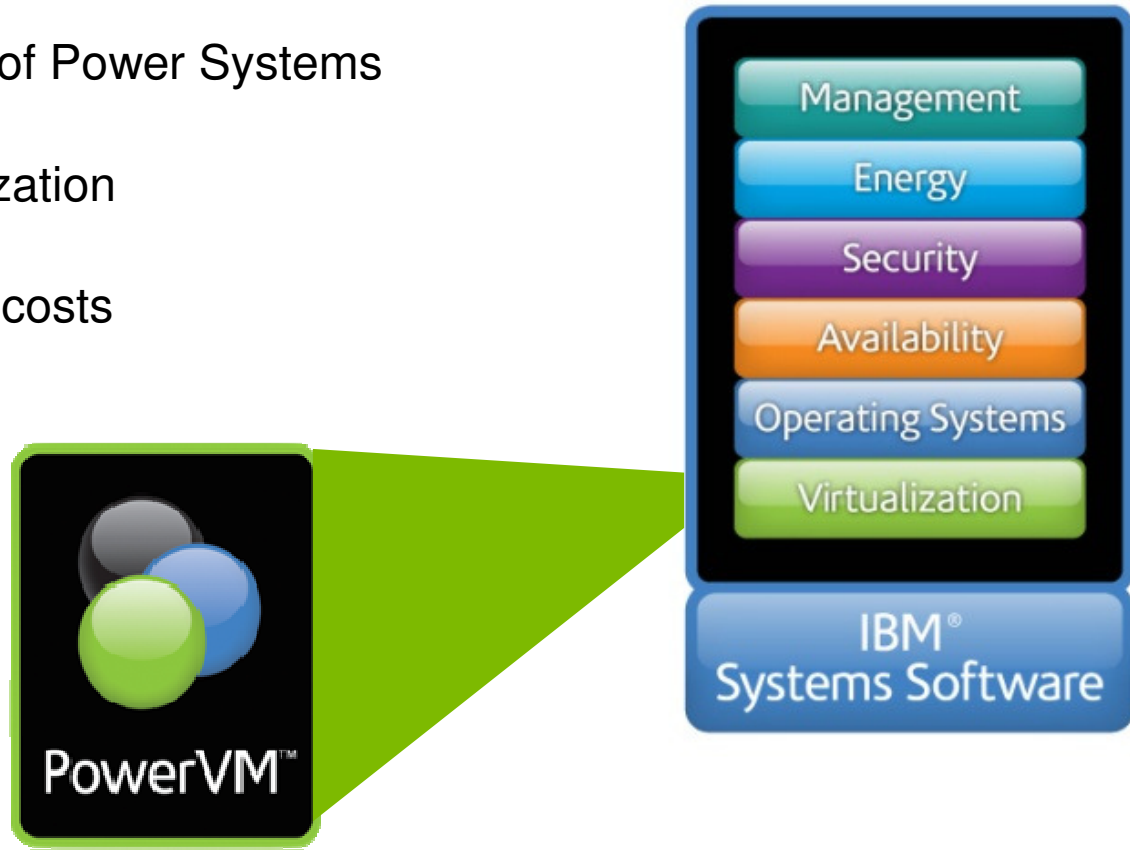
- Start with generic motherboard
- Insert third-party CPU
- Install third-party hypervisor

- **IBM Power Systems approach:**

- Start with leadership CPU
- Design industrial-strength server
- Integrate world-class virtualization

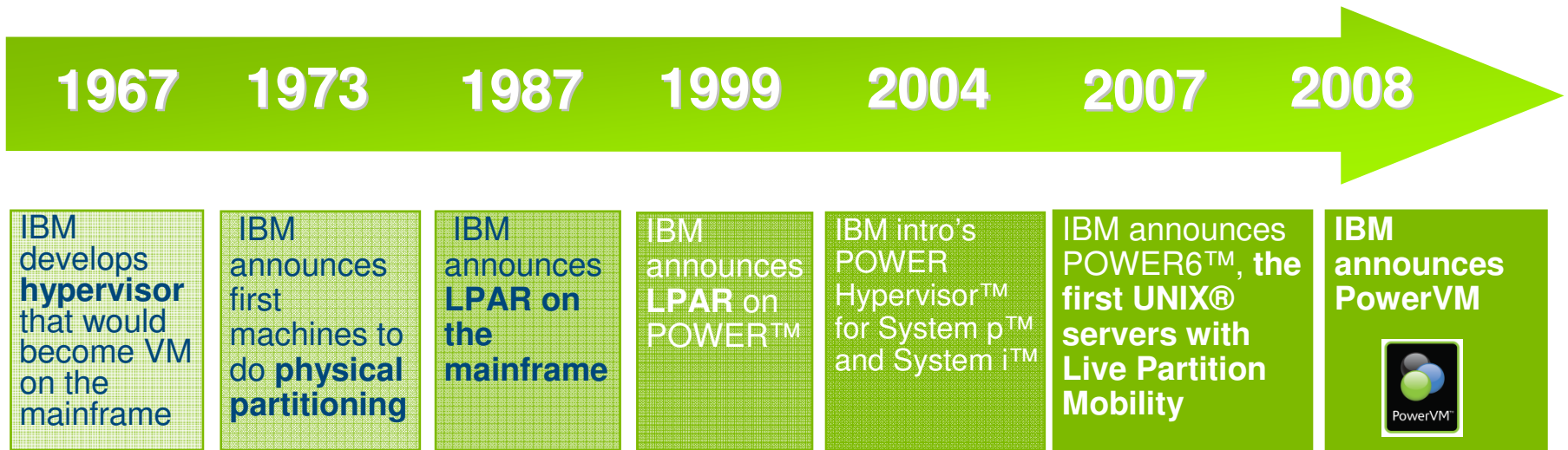
# PowerVM: Virtualization Without Limits

- Sold with more than 70% of Power Systems
- Improves IT resource utilization
- Reduces IT infrastructure costs
- Simplifies management



# IBM's History of Virtualization Leadership

*A 40 year tradition continues with PowerVM™*



**PowerVM is the leading virtualization platform for UNIX, IBM i and Linux® clients**

- ✓ Unify virtualization branding & technology for AIX®, i and Linux
- ✓ Exploit 40 years of IBM virtualization leadership

## What is PowerVM?

*Hardware and software that delivers industry-leading virtualization on IBM POWER processor-based servers for UNIX, i and Linux clients*



### PowerVM Editions feature

- Micro-Partitioning™
- Virtual I/O Server
- Integrated Virtualization Manager
- Live Partition Mobility
- Lx86
- Logical Partitioning

PowerVM is the new umbrella branding term for Power™ Systems Virtualization (Logical Partitioning, Micro-Partitioning, POWER Hypervisor, Virtual I/O Server, etc.)



## The future of UNIX

*“For the second year in a row, AIX scored the highest reliability ratings among 15 different server operating system platforms” - ITIC 2009*



## Total integration with i

*“Costs for use of Power Systems and IBM i 6.1 average 41 % less than x86 servers and Microsoft Windows” - ITG 2010*



## Scalable Linux ready for x86 consolidation

Queensland Motorways replaced legacy Windows x86 traffic management systems with new SAP running Linux on Power



# All 3 operating environments available with POWER7

# Using an entire IBM stack provides leading performance for applications.

## IBM WebSphere Application Server 7

1 JVM  
AIX TL4  
64 bit  
16 threads



IBM Power 750  
8 cores  
3.55GHz



**3920**

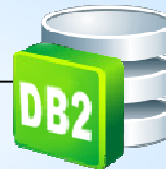
Transactions/sec

## Competitive application server

1 JVM  
Windows  
64 bit  
16 threads



Nehalem EP  
8 cores



**73%** more work per JVM image

- ✓ Simpler configurations
- ✓ Better scale

**2260**

Transactions/sec

# Build Message Backbones With Huge Capacity

## IBM Message Broker execution groups leverage available threads on POWER7

**Message Workload**



**IBM Message Broker v7**

7 Execution Groups  
MQ Server 7.0.1  
AIX v6.1 64 bit

**IBM  
Power 750 3.0 GHz  
8 cores**

**21,808**  
Messages/sec



**53 times faster**

**Message Workload**



**Microsoft Biztalk 2009**

12 Host Instances  
**SQL Server 2008**  
MQ Server 7.0.1  
Windows 32bit

**Nehalem EP  
8 cores**

**409**  
Messages/sec

Workload is mix of in/out, routing, transformation, transformation and routing messages

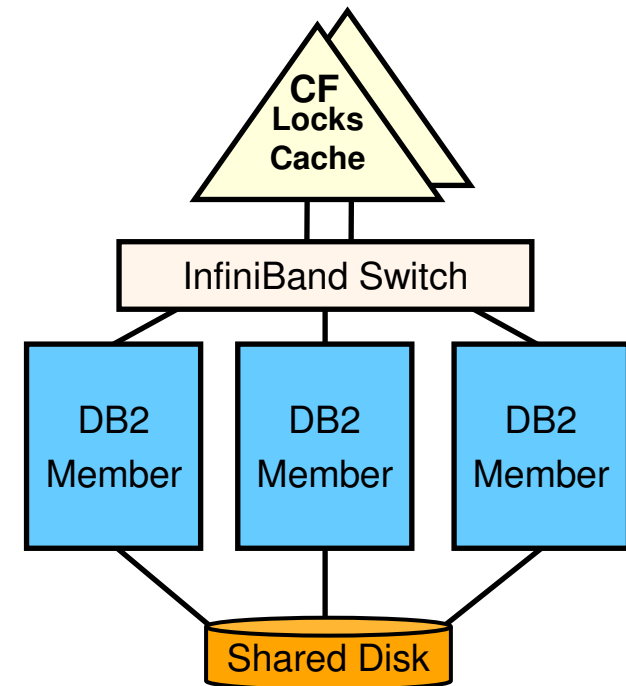
**Power your planet.**

Projecting from Power 570 8 cores 4.7GHz to Power 750 8 core 3.0GHz using rPerfs



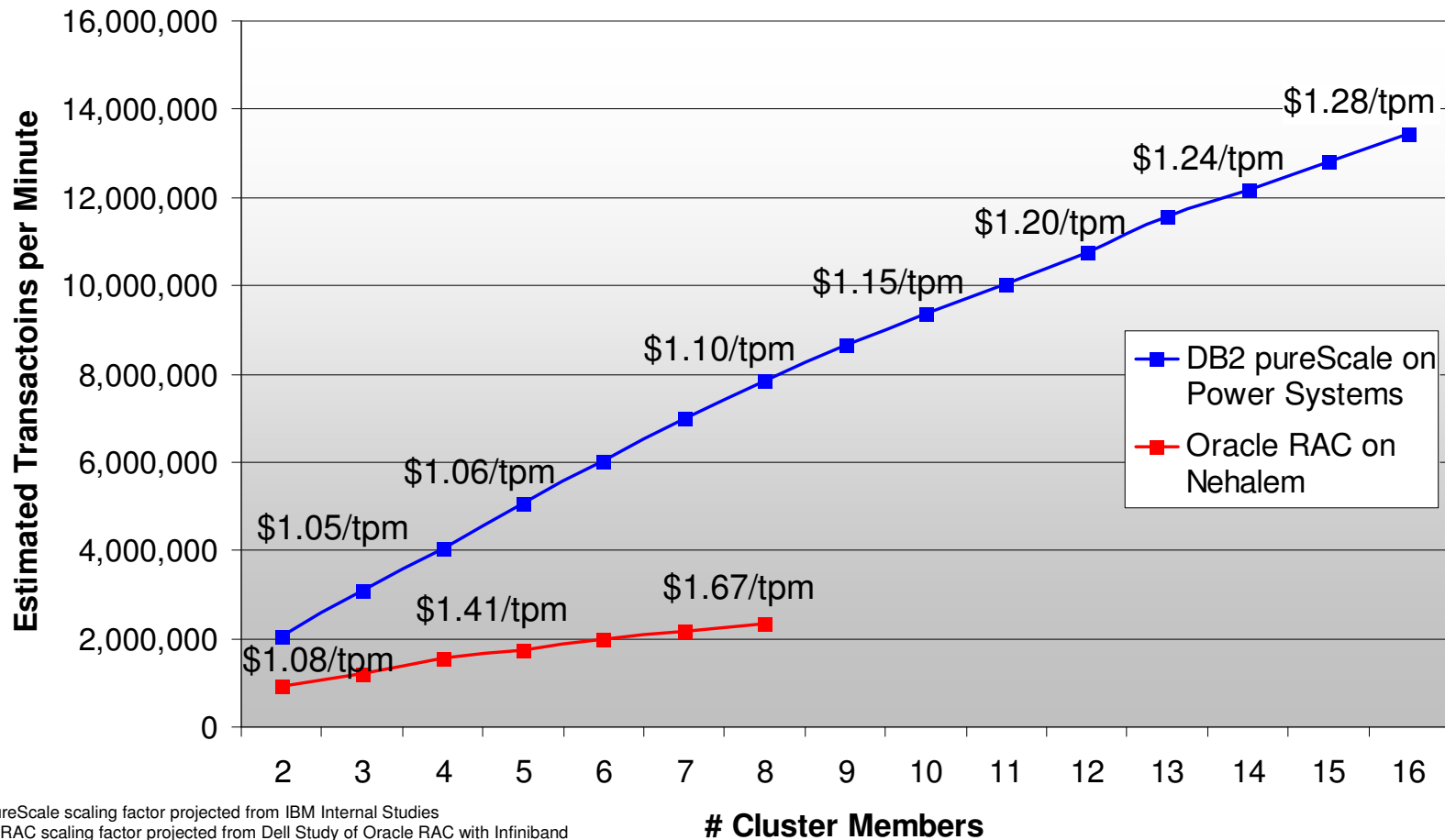
## Cost Effective Data Base Processing With Massive Scale

- ✓ Unique DB2 pureScale clustering design achieves near linear scaling
  - ✓ No partitioning required
  - ✓ Available only on Power Systems
- ✓ Large clusters can harness the power of a massive number of POWER7 execution threads
- ✓ Huge capacity
  - ✓ Near Linear Scaling up to 128 members
    - ✓ 64 members: 95% of linear, 128 members: 84% of linear
  - ✓ Oracle RAC typically scales poorly beyond 4 to 8 nodes for a non-partitioned data base



# DB2 pureScale on POWER7 – Competitive Price Performance With Far More Scalability

## pureScale vs. Oracle RAC Projected Transaction Scalability

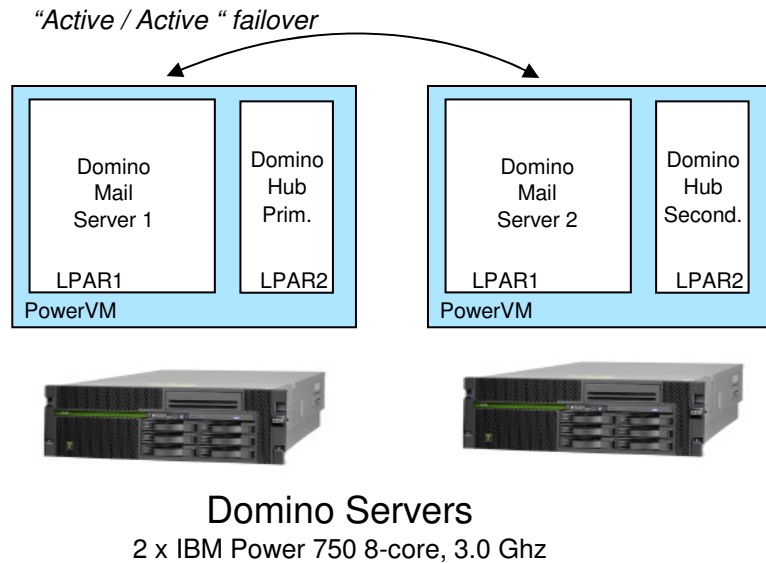


DB2 pureScale scaling factor projected from IBM Internal Studies  
 Oracle RAC scaling factor projected from Dell Study of Oracle RAC with Infiniband  
<http://www.dell.com/downloads/global/power/ps2q07-20070279-Mahmood.pdf>  
 Price per tpm includes 3-year total cost of acquisition of hardware, software, maintenance  
 Price does not include storage or networking

# Simplify Email Infrastructure And Reduce Costs

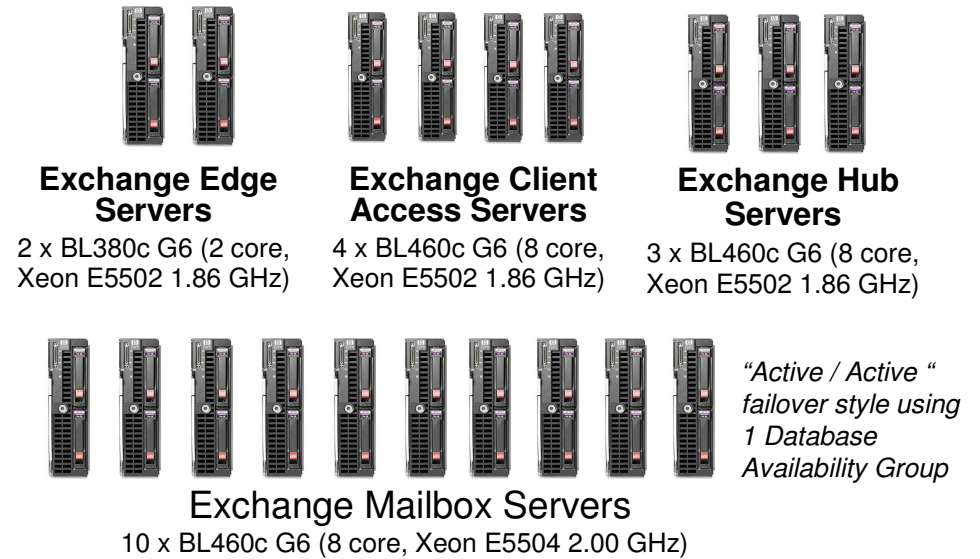
## Case Study – Support 40,000 Users

### Domino 8.5 on POWER7



- ✓ 2 servers total, 20,000 mailboxes per server
- ✓ 40,000 total active users
- ✓ **\$100** per user per year TCO (3 yrs)

### Exchange 2010 on Nehalem



- ✓ 19 servers total
- ✓ 10 mailbox servers, 4000 mailboxes per server
- ✓ **\$166** per user per year TCO (3 yrs)

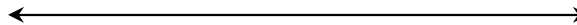


# 83%

savings on energy costs with 28% more performance at a fraction of the price using a single **IBM Power 750** instead of a 64-core HP Integrity Superdome.

## Superdome or Super Power?

Shown to actual scale



### HP Integrity Superdome 64c

- 1.6GHz dual-core Itanium2 in a 30"x77.2"x48" frame
- Maximum energy requirement of **11,586 Watts**
- SPECint\_rate2006: 824

### IBM Power 750 Express

- 4 socket, 32 Core 4Ux19" wide
- POWER7 Processors
- Maximum energy requirement of **1,950 Watts**
- SPECint\_rate2006: 1060



# 84%

## Reduction in energy usage moving from POWER5 to POWER7.

Savings extend to floor space, software license costs, and maintenance. Increase your performance and capacity.



**POWER5 570** systems  
*64 cores @ 1.9 GHz*  
*30% utilization*



### Power 770

*24 cores @ 3.5 GHz*  
*60% utilization*

**50%** effective capacity increase

**84%** reduction in energy usage

~**\$250K** maintenance savings over 3 years

> **\$1M** savings in software licensing

With room to spare to consolidate x86 workloads

# Large Scale Of POWER7 Cuts Costs In Half

## 8-core Nehalem Servers

**5**  
Network  
Switches

**98**  
Cables

**45**  
Nehalem  
Servers  
**360**  
Cores



**Hardware + Software: \$2.97M**

**Labor: \$1.05M**

**Total Cost: \$4.02M**

## IBM Smarter Systems with POWER7

**2**  
Network  
Switches

**10** Cables

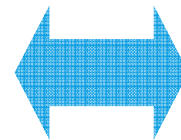
**1** Power 770  
**64** cores



**Hardware + Software: \$1.16M**

**Labor: \$0.74M**

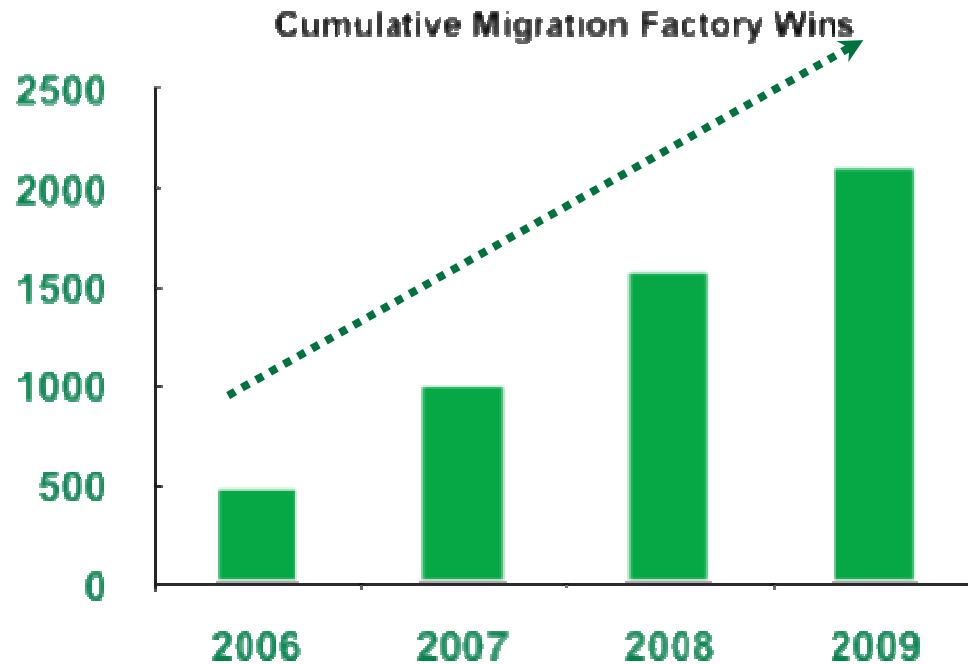
**Total Cost: \$1.90M**



# 2,100

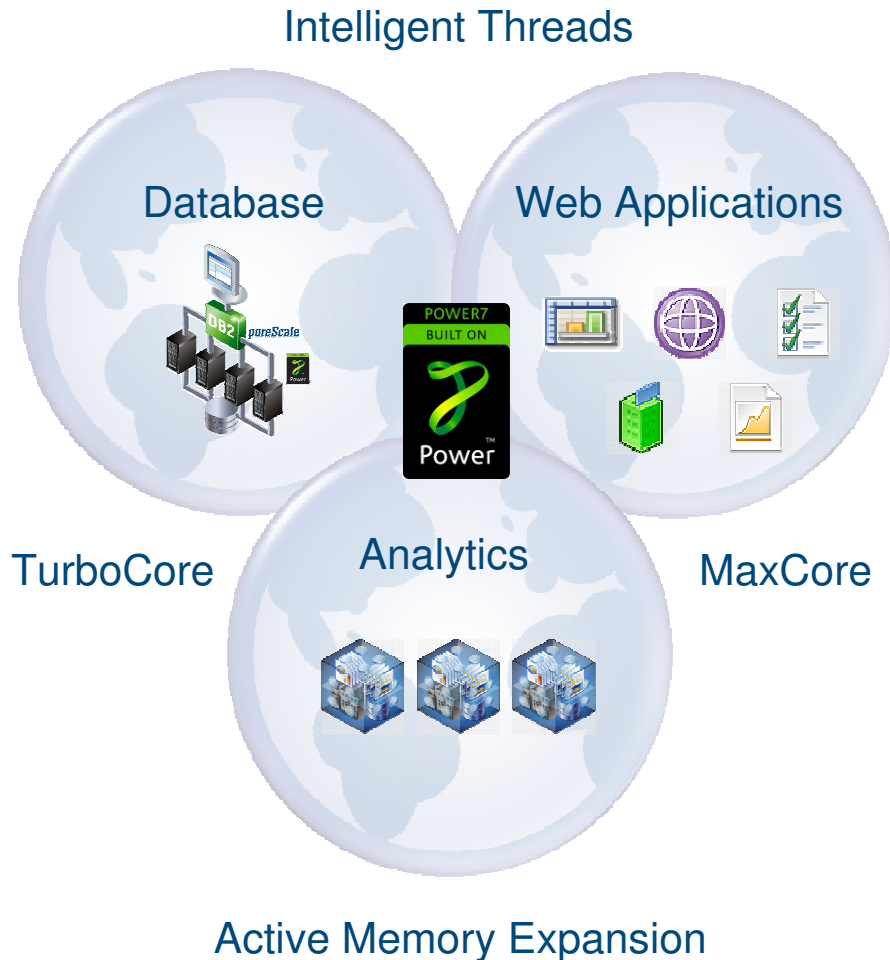
successful Power Migration Factory migrations to date.

There were over 500 Power migrations during 2009, with more than 90% from Sun and HP customers (including x86 consolidation). In 4Q09 alone, Power® Systems achieved nearly 200 competitive migrations.



# IBM Delivers Workload Optimized Systems

## Unparalleled flexibility and range



### 73% better

performance using a single JVM of WebSphere on POWER7 vs. competitive application server on Nehalem<sup>1</sup>

### 20-30%

Improvements in application quality and development productivity with Rational software delivery platform<sup>2</sup>

### 40% lower cost

Lotus Domino on POWER7 supporting 40,000 users vs. Microsoft Exchange on Nehalem<sup>3</sup>

### Near linear scaling

With DB2 pureScale, for superior business agility and virtually unlimited capacity

### Up to 40%

More efficient through better systems management<sup>4</sup>



# Power is...

**Workload-Optimizing Systems**

**Virtualization without Limits**

**Resiliency without Downtime**

**Dynamic Energy Optimization**

**Management with Automation**

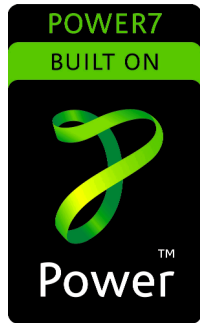
**Integrated Value**





# Power your planet.

Smarter systems for a Smarter Planet.



# Thank you!

ありがとうございました

Japanese

**Danke**

German

**Merci**

French

*Grazie*

Italian

감사합니다

Korean

धन्यवाद

Hindi

Gracias

Spanish

Спасибо

Russian

شكراً

Arabic

ขอบคุณ

Thai

多谢

Simplified Chinese

Obrigado

Brazilian Portuguese

多謝

Traditional Chinese