



Smarter Computing. System z – Designed For Next-Era Critical Data Workloads

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What Workloads Should Be Run On System z?

Many possible workloads



Sweet Spot
Best fit for purpose
Best economics

What Workloads Should Be Run On System z?

- Critical Data Workloads
- Transaction Processing
- Batch Processing
- Co-located Business Analytics
- Consolidated on one platform

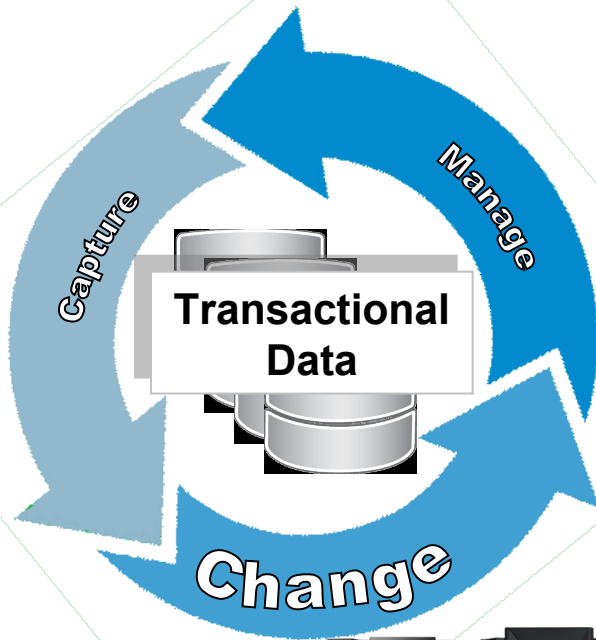
What Makes System z Optimum For These Workloads?

- Concentrated processing power in a single complex
- Cache structures optimized for larger working sets
- Dedicated I/O sub-system with large scale I/O bandwidth
- DS8000 storage systems capacity and performance
- “Perfect” workload management
- DB2 Analytics Accelerator facilitates co-located analytics
- Industry-leading RAS and security
- Better labor productivity

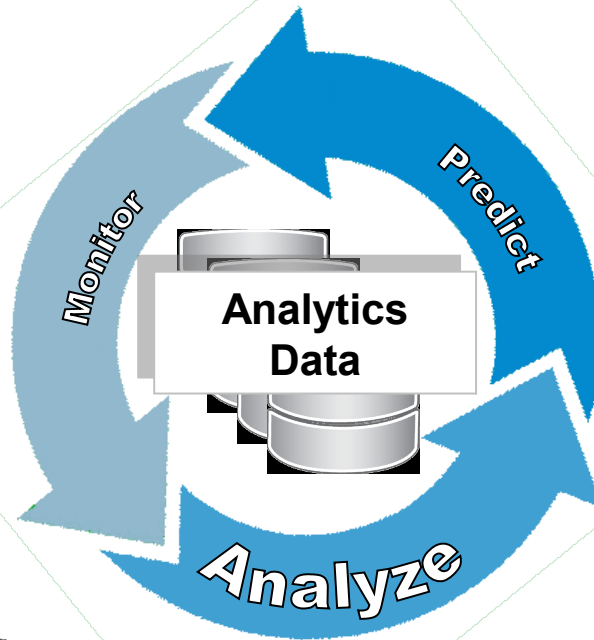
Result: Unbeatable Performance With Best Economics

IBM zEnterprise System Is Optimized For Critical Data

Run the business



Grow the business



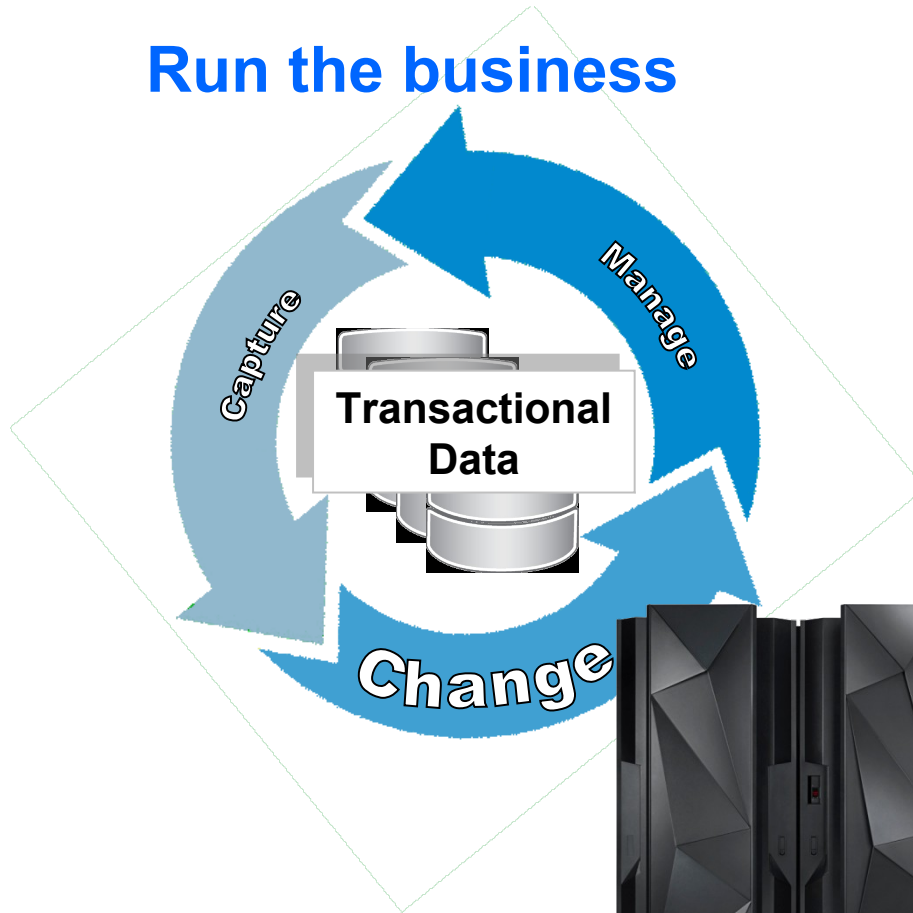
Data integrity
Efficiency at scale
Ultimate security



Fastest analytics
Co-located workloads
Workload management

Let's Focus On Transactional Workloads

Run the business



IBM zEnterprise EC12



- Transactional integrity with rock solid CICS, IMS, and DB2
- Unique design for efficiency at scale for both processing and data
- Trusted security and availability

Global Business Requires Transactional Efficiency At Scale

Trusted by the world's top businesses

2/3 of all business transactions for US retail banks run directly on mainframes

DB2 on z/OS runs on **all 65** of the world's top banks, **24 of the top 25** US retailers, and **10 of the top 10** global insurance providers

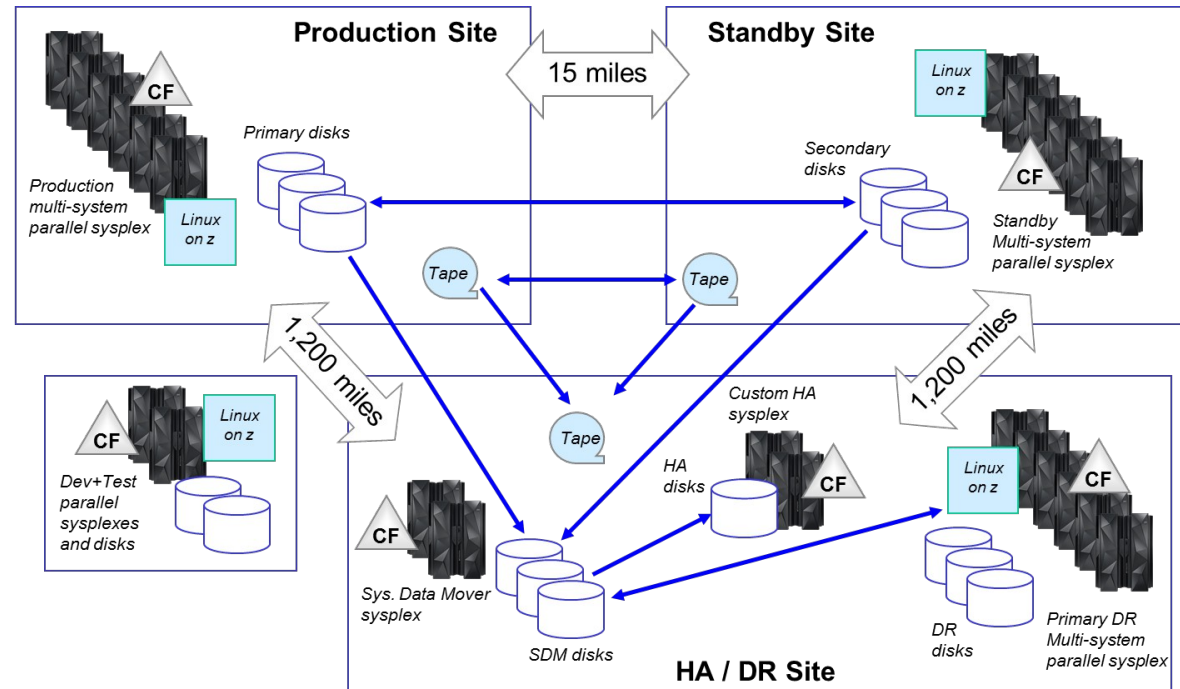
“Millions of users unknowingly activate CICS every day, and if it were to disappear the world economy would grind to a halt.”

Phil Manchester, Personal Computer Magazine

March 1994

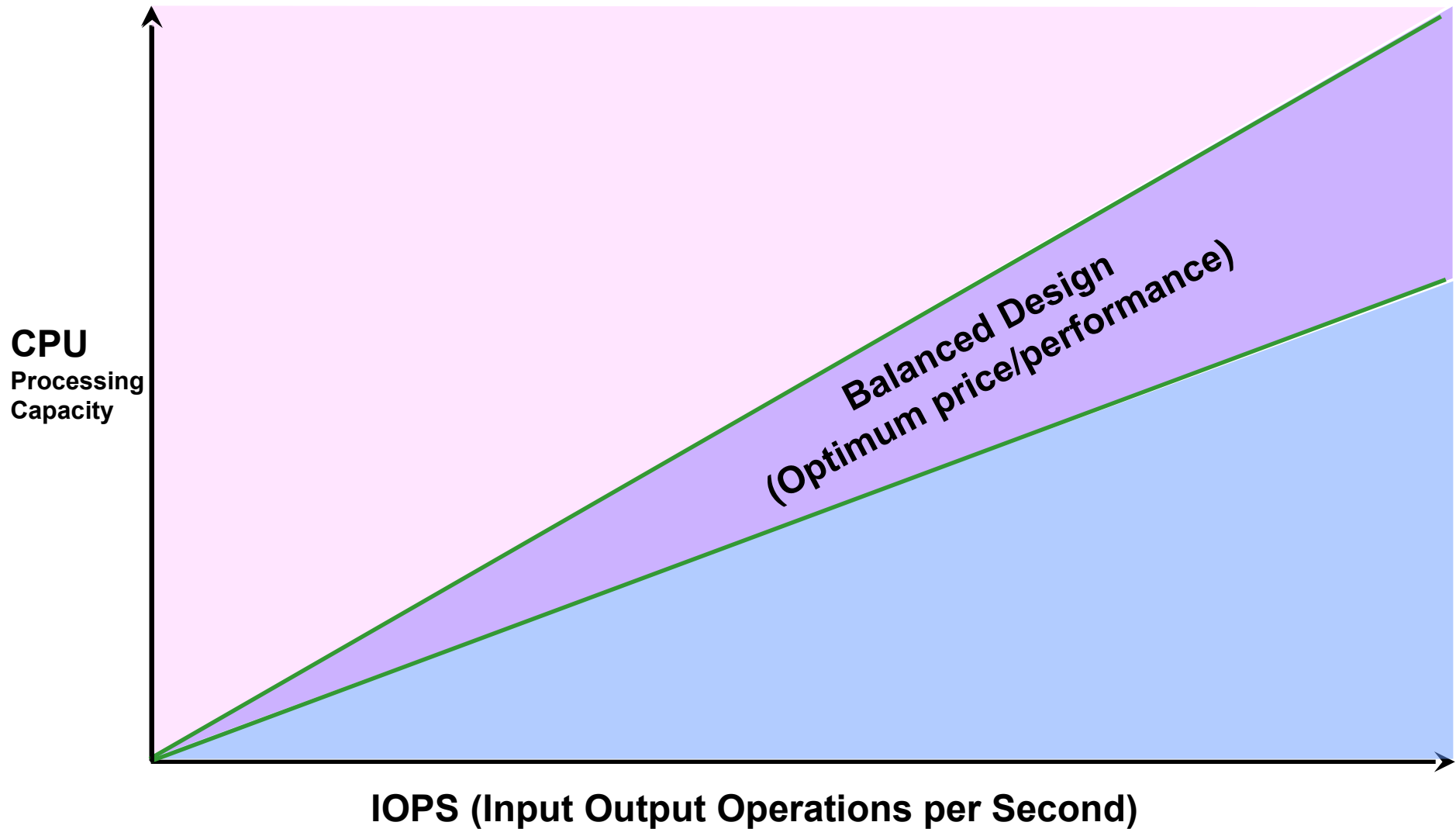
State-Of-The-Art Global Scale Transaction Processing

- 1B CICS trans/day
- 4,000 IMS trans/sec
- 14M ACH transactions in 2.5 hours
- 6-way sysplex
 - ▶ 30ms response
 - ▶ 216 engines at primary site
 - ▶ 200K MIPS

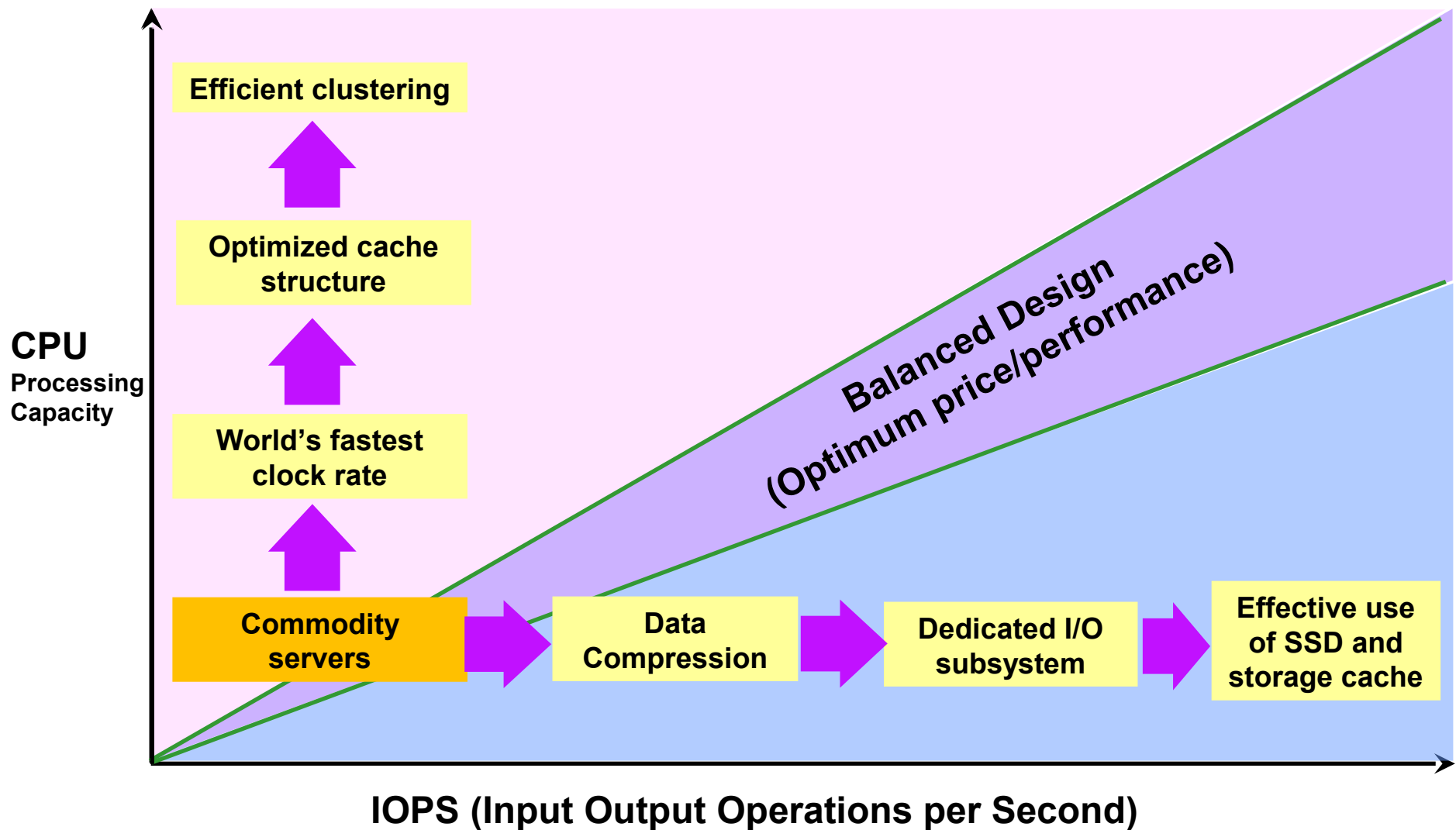


- Zero outages, zero customer impact
- Linux is Active-Active in the two data centers, with zero downtime
 - ▶ 15% Linux, growing at 30% p.a.
- *“Crazy about security overall, and the z system has a fortress around it”*

Transaction Processing Requires A Balance Of Capabilities

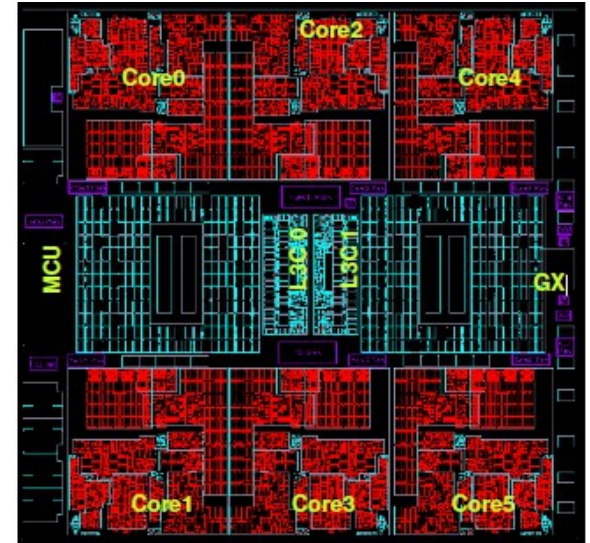


zEnterprise EC12 Design Is Unique And Optimized For Transaction Efficiency At Scale



The New zEnterprise EC12 Delivers Unmatched Processing Capacity

- **World's fastest processor**
 - ▶ 5.5 GHz clock rate
 - ▶ 120 total processors (101 configurable)
 - ▶ 6 cores per chip
- **More memory**
 - ▶ 48MB on-chip L3 shared cache
 - 8MB on-chip cache/core
 - ▶ 1.5GB total shared L4 cache
 - 384MB per book
 - ▶ Up to 3TB main memory
- **Large server design**
 - ▶ Over 78,000 MIPS capacity

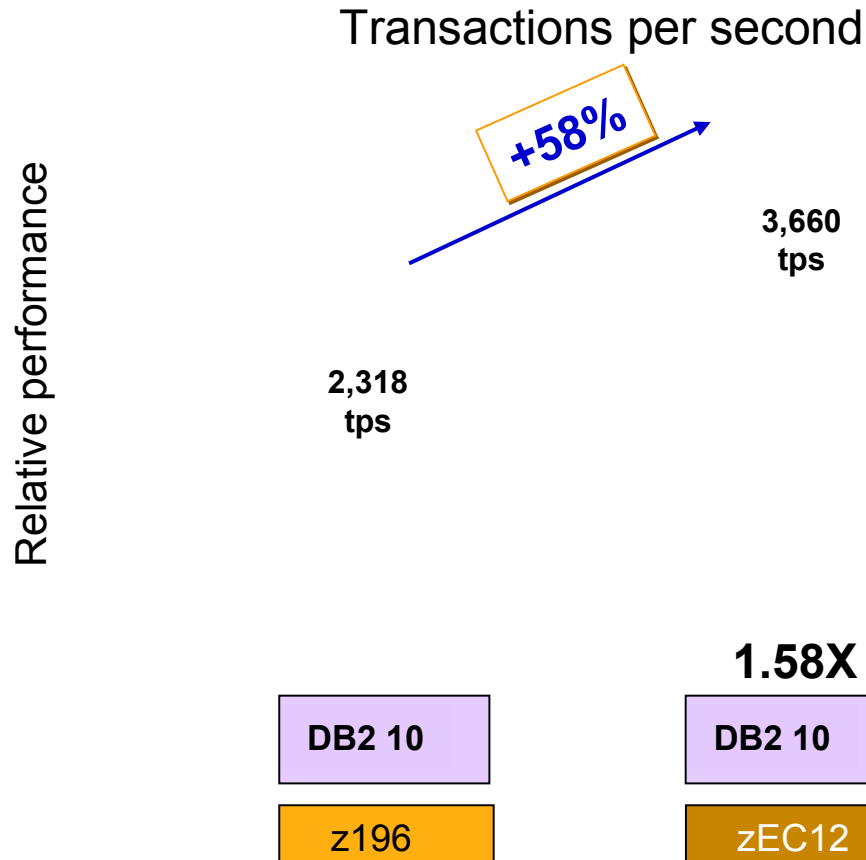


*6 cores
per chip*



*Multi Chip
Module
One per book*

Continuous Processing Improvements For Transactional Workloads



- Faster processors
- More I/O bandwidth due to:
 - ▶ 8GBps PCIe interface
 - ▶ Upgrade to FICON Express8S

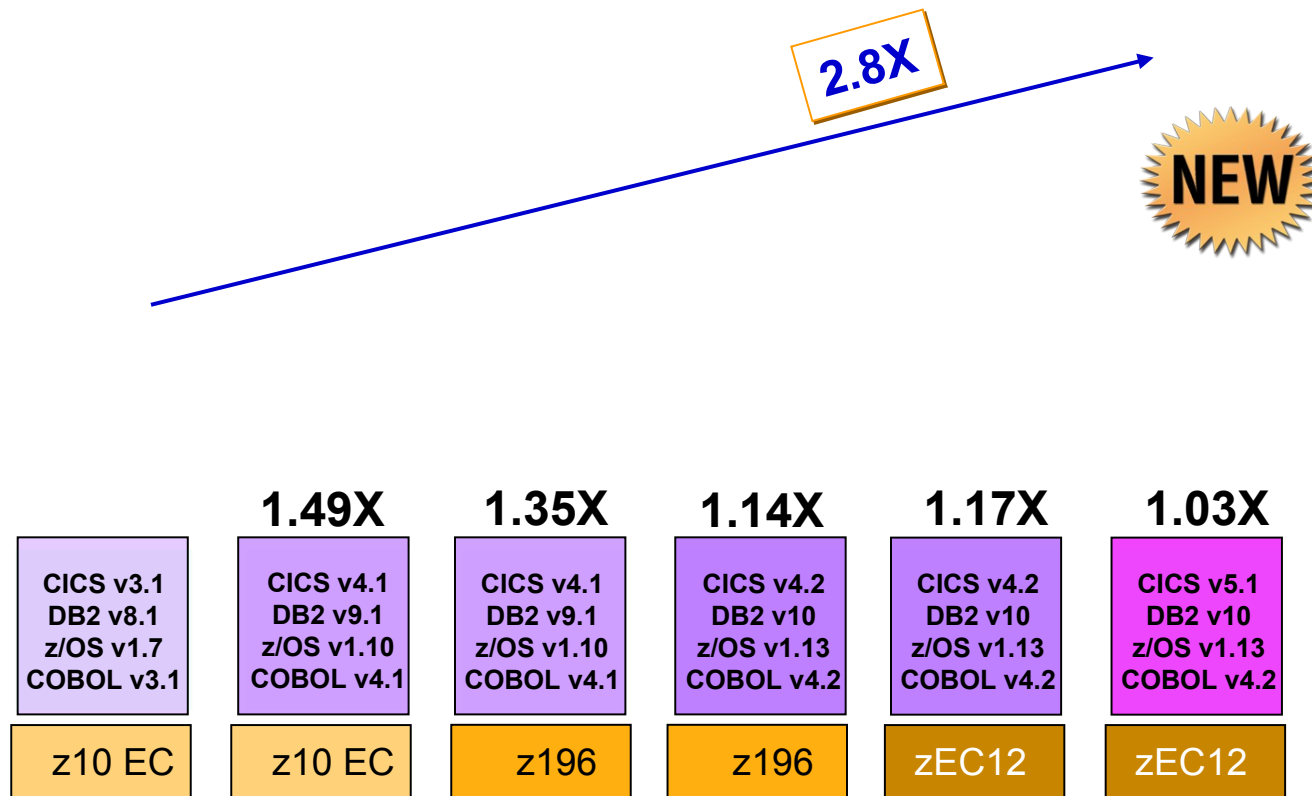
Database I/O Intensive Performance Study (with SSDs)

Performance measured in User Interactions per second.
z196 results run on GA1. Results may vary.

Continuous Processing Improvements For Transactional Workloads

IBM internal core banking transactional workload (Friendly Bank)

Relative performance



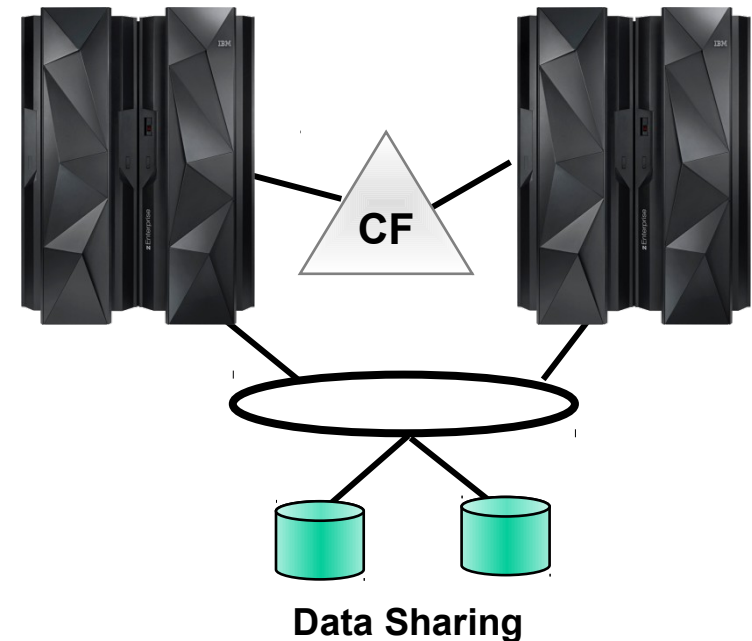
CICS 5.1 adds significant new functionality (e.g. Liberty profile, mobile, cloud, etc.) AND boosts performance by 3%!

Performance measured in User Interactions per second.
z196 results run on GA1. Results may vary.

zEC12 Parallel Sysplex Clusters Provide Even More Processing Power

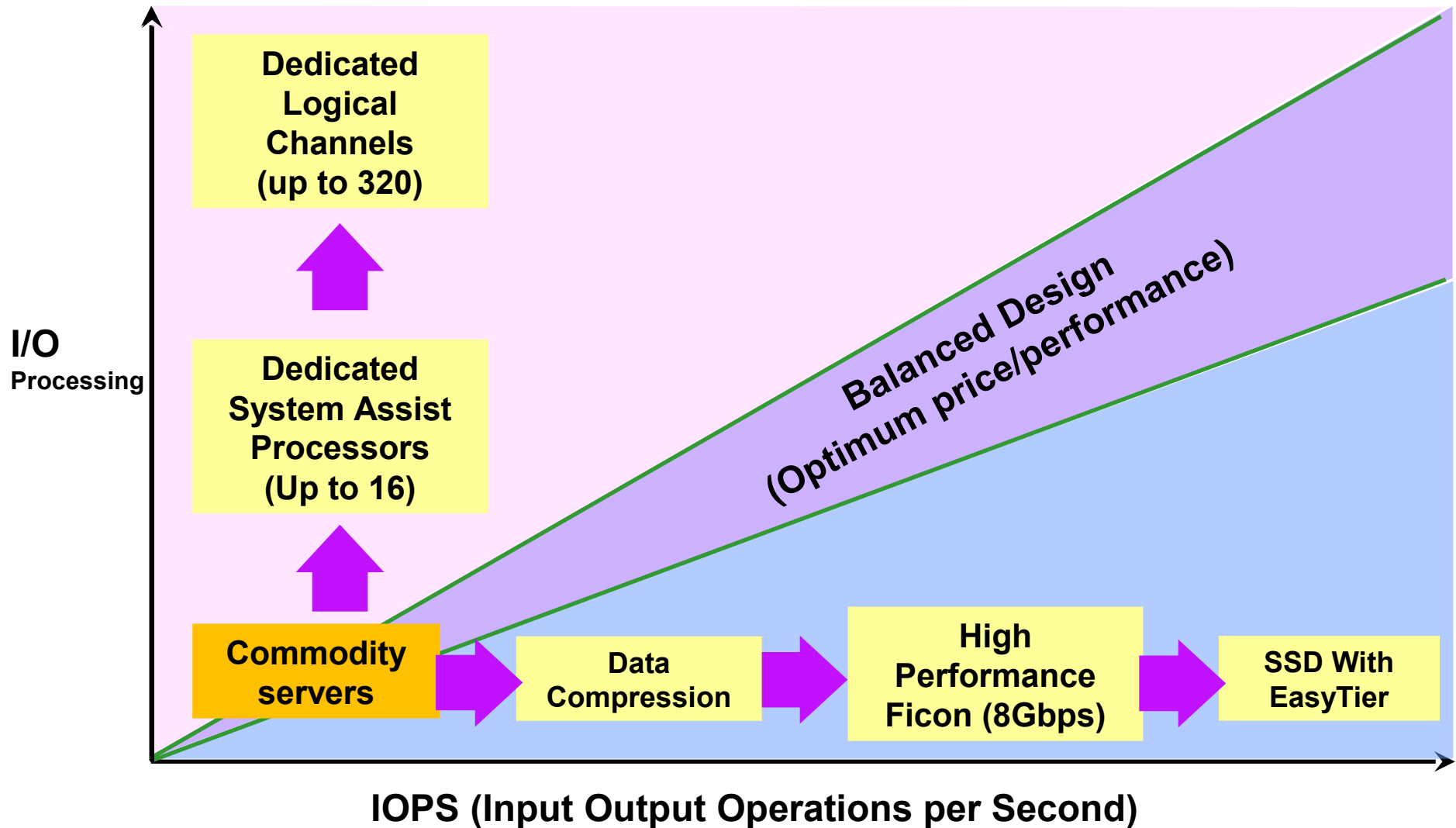
- Specialized hardware - Coupling Facility
 - ▶ Dedicated processor with specialized microcode to coordinate shared resources
 - ▶ High speed inter-connect to clustered systems
 - ▶ Hardware invalidation of local cache copies
 - ▶ Special machine instructions
- Exploited by IMS, CICS, DB2, MQ, and other middleware on z/OS to achieve near-linear transaction processing scale

■ Delivers efficiency at scale

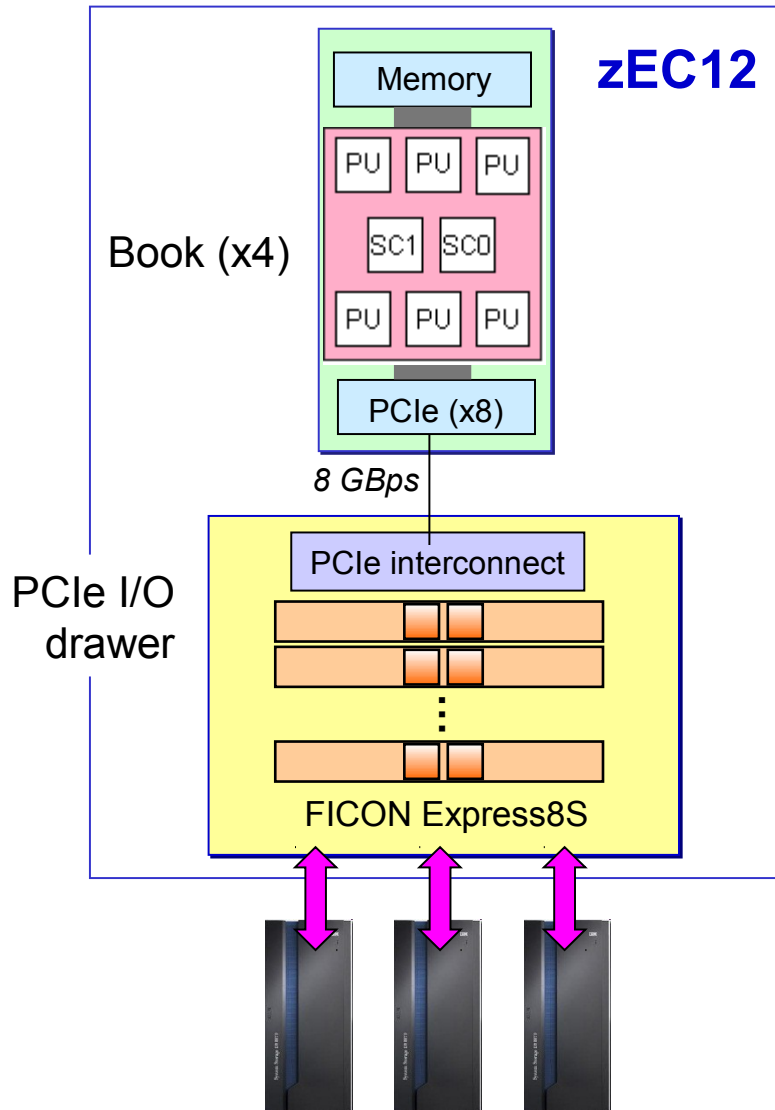


**Cluster up to 32 nodes
for a total of 3,712 cores**

zEnterprise EC12 Delivers Unmatched I/O Processing Capabilities



zEC12 Has A Dedicated I/O Subsystem For High I/O Bandwidth



- **Up to 16 dedicated System Assist Processors (SAPs)**
 - ▶ All I/O requests are offloaded to SAPs
 - ▶ 16 SAPs can sustain up to **2.4M IOPS***
 - ▶ I/O subsystem bus speed of 8 GBps
 - ▶ Number of SAPs increases from 4 to 16 according to system size
- **Up to 160 physical FICON cards for I/O transfers**
 - ▶ Up to 320 RISC processors (2 per card)
 - ▶ Up to 320 FICON channels (2 per card)
 - ▶ 384 GB/Sec I/O aggregate per zEC12
- **IBM DS8800 Storage System**
 - ▶ Up to 440K IOPS capability
- **Delivers I/O efficiency at scale**

* Recommend 70% max utilization – 1.7M IOPS
Numbers represent High Performance FICON traffic

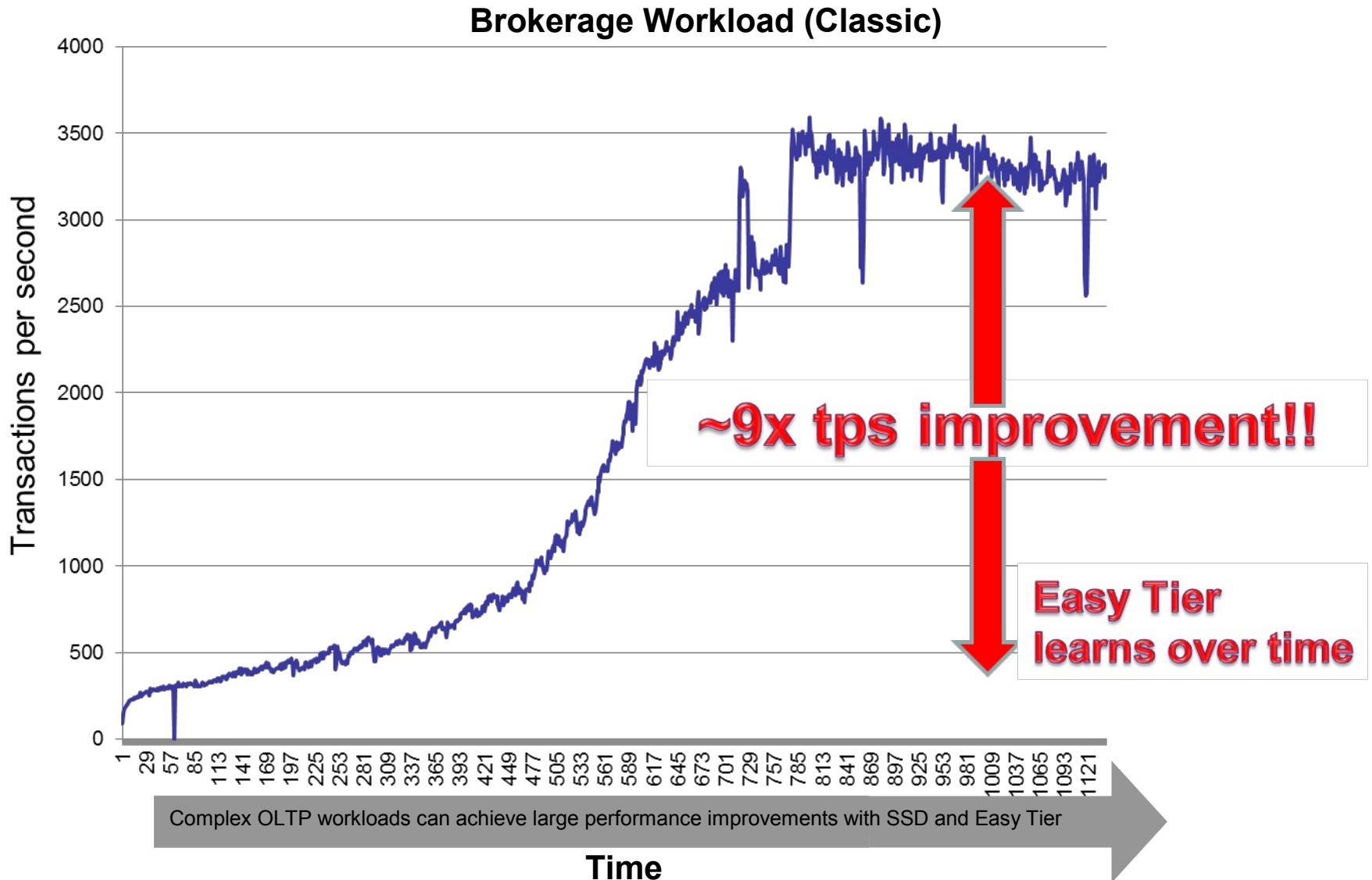
IBM DS8000 Smarter Storage Is Self-Optimizing To Improve Performance And Productivity

- Easy Tier migrates most frequently accessed data to faster storage
 - ▶ Less frequently accessed data moved to high capacity storage
- Migration based on actual usage
 - ▶ No administrator intervention
 - ▶ No missed hot spots
 - ▶ No application changes needed
- Performance gains up to 9x on I/O intensive workloads*



* Note: Based on IBM internal study of Brokerage database workload run on Easy Tier with 95% migration to SSD vs. well tuned baseline running on all HDDs. Performance measurements were specific to the configuration used. Your results may vary. Contact IBM to see what we can do for you.

Up To 9x Throughput Benefit Using SSDs, Automatically



zEnterprise EC12 Efficiency At Scale – Multi-tenant Database Workloads

Which platform can achieve the lowest cost per workload?

1 workload on **16-core** quarter unit



Pre-integrated Competitor Multi-Tenant Private Cloud

\$2.27M
per workload (TCA)



High Volume Trading Workload

Database I/O Intensive Workloads each driving a minimum* of **243** transactions per second on 200GB database

5 multi-tenant workloads on zEC12 **4-cores**



DB2 10 for z/OS on zEC12

\$1.66M
per workload (TCA)

20x DB density
25% lower cost

* Maximum TPS was measured at 270 based on 70 ms injection interval for customer threads. SLA requires no more than 10% degradation in throughput, yielding a minimum TPS of 243

Trusted Resiliency – Protect Critical Data End To End

SECURITY dark READING

10 Top Government Data Breaches Of 2012

SQL injection, post-phishing privilege escalation, and poorly secured back-up information all played their part in exposing sensitive government data stores this year

Nov 29, 2012 | 04:26 AM | [1 Comment](#)

Zaxby's Computers Possibly Compromised, Diners Alerted

Posted on: 1:52 pm, January 16, 2013, by Carter Watkins

[Recommend](#) 3 [Facebook](#) 3 [Pinterest](#) 0 [Share](#) 3 [Twitter](#) 0 [Email](#)

FLORENCE, Ala. (WHNT) – A data security breach at a well-known chicken restaurant may have led to your credit and debit card being compromised.



Zaxby's restaurants across the south-east made this announcement after malicious software was found on their computer servers.

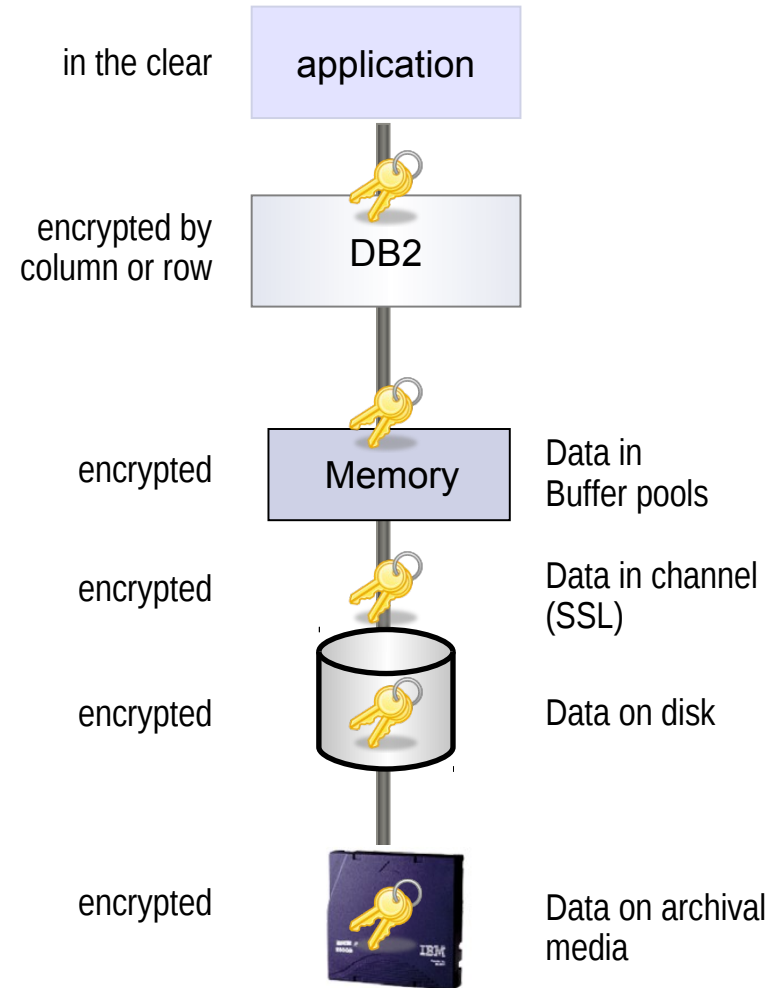
Privacy Rights Clearinghouse noted **292** US hacking breaches from 2012 through May 2013, involving 9.5 million sensitive records ...

System z breached data records: **0**

Source: <http://www.privacyrights.org/data-breach/new>
<http://www.darkreading.com/database-security/167901020/security/news/240142846/10-top-government-data-breaches-of-2012.html>
<http://whnt.com/2013/01/16/zaxbys-computers-possibly-compromised-diners-alerted/>

DB2 Top To Bottom Data Security

- DB2 supports encryption at every level
 - ▶ In memory, buffers, disk, and archival media
 - ▶ Table, index, logs, and backup copies
- DB2 provides multiple options for table encryption
 - ▶ Row and column level encryption
- DB2 supports Multi-Level Security (MLS)
 - ▶ Allows users with different access authority to safely access the same database image
- DB2 uses either CPACF or Crypto Express4S for encryption



DB2 Maturity Delivers A Proven Track Record For Data Security

Cumulative Database Security Fixes Since 1Q10

— Oracle DB
— DB2 on z/OS

Oracle: **22** security patches during the past year:

- April 2013 – 128 total, **4** for the database
- January 2013 - 88 total, **6** for the database
- October 2012 - 109 total, **5** for the database
- July 2012 - 87 total, **7** for the database

DB2 – only 40 security patches over past **29** years

Virtualized System z Security Is Superior To Other Platforms And Augmentation Costs Less

Security Natively Covered by Platform

Security Level Description	MF	x86	UNIX
Normal corporate	100.00%	21.00%	35.00%
Credit card processing involved	100.00%	14.00%	26.00%
Banking	100.00%	8.00%	14.00%
Healthcare	100.00%	7.50%	11.00%
Research	78.00%	3.00%	8.00%
Defense	64.00%	1.00%	3.00%

Major security deficiencies on distributed platforms

Distributed platforms require **considerable additional expense**

On System z most security requirements are standard

Little additional augmentation required on System z

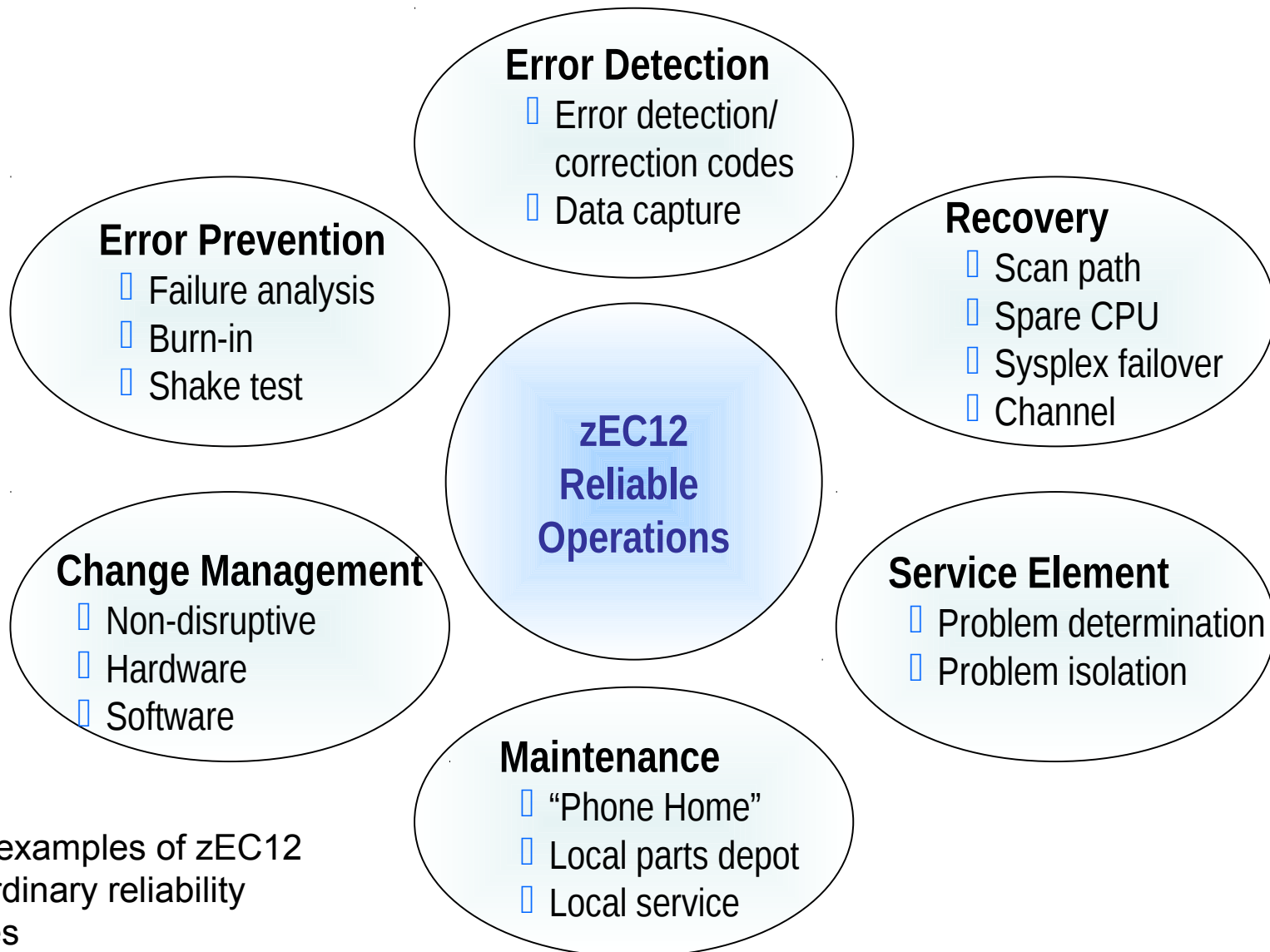
Incremental Cost to Achieve Required Security

Security Level Description	MF	x86	UNIX
Normal corporate	0.00%	25.20%	12.10%
Credit card processing involved	0.00%	38.40%	16.90%
Banking	0.00%	63.70%	22.40%
Healthcare	0.00%	81.60%	30.70%
Research	2.10%	134.80%	56.90%
Defense	4.30%	187.90%	97.50%

Source: "Comparing Virtualization Alternatives – What's best for your business?"

© 2012, Solitaire Interglobal Ltd. <http://public.dhe.ibm.com/common/ssi/ecm/en/zsl03192usen/ZSL03192USEN.PDF>

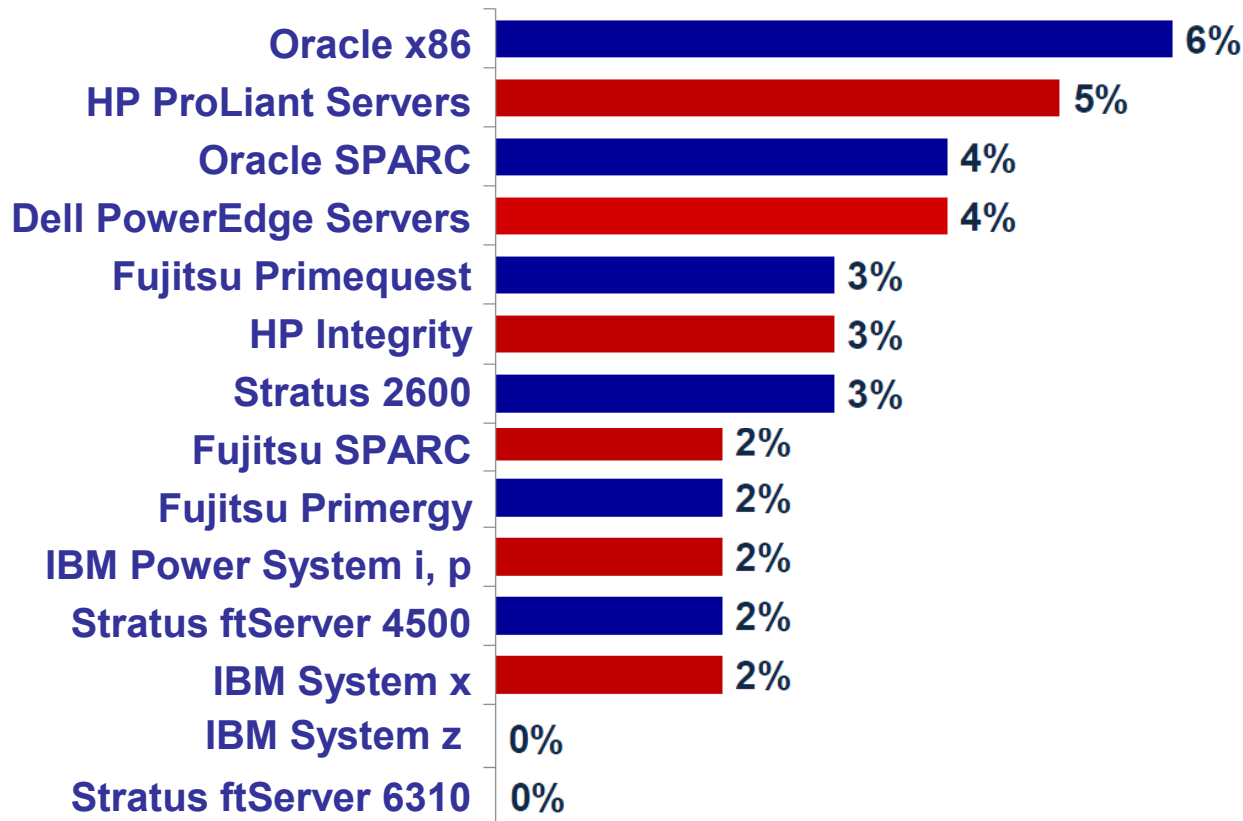
Trusted Reliability – Comprehensive Protection To Ensure Availability Of Critical Data



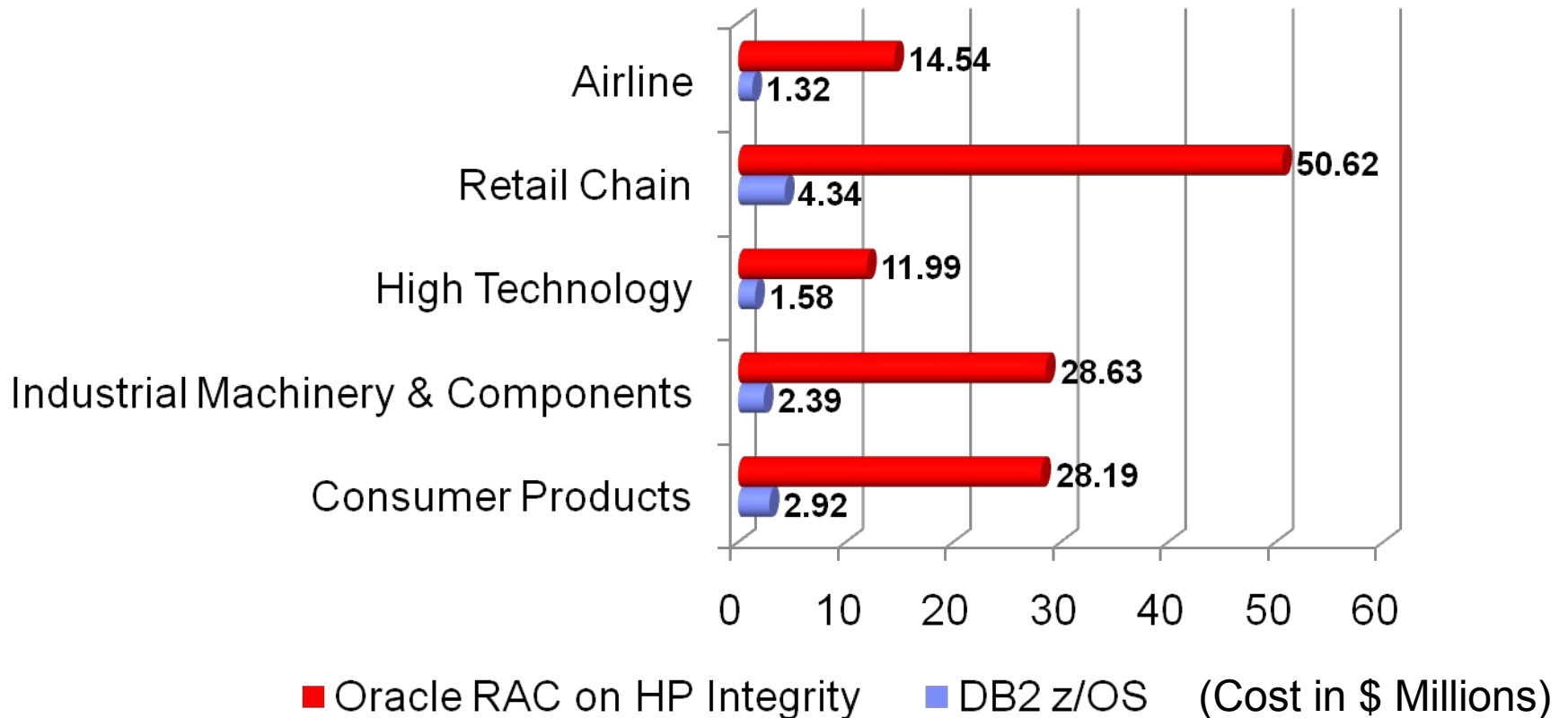
Some examples of zEC12 extraordinary reliability features

“IBM’s System z Mainframes Recorded The Least Amount Of Downtime Of Any Hardware Platform”

Downtime of more than four hours on each server hardware platform (2012-2013)



Cost Of Downtime For SAP On DB2 z/OS Trumps That Of SAP On Oracle RAC



Source: ITG 1005: Business Case for IBM System z – Bottom Line Impact of Availability and Recovery For SAP Enterprise Systems

Smarter Planet, Smarter Cities Need A Smarter Infrastructure For Critical Data

- Not just banks, insurance, logistics, travel companies
- Smarter Cities have critical data workload requirements
 - ▶ Global Scale Transaction Processing
 - ▶ Large Scale Batch Processing
 - ▶ Co-located Business Analytics

For example,

IBM's Smarter Cities Intelligent Operations Center

.... see the demo

Leading The World For Critical Data Workloads

IBM zEC12



zEC12

- Data integrity
- Efficiency at scale
- Ultimate security