Delivering Innovative Solutions to Meet Current and Future Market Demands

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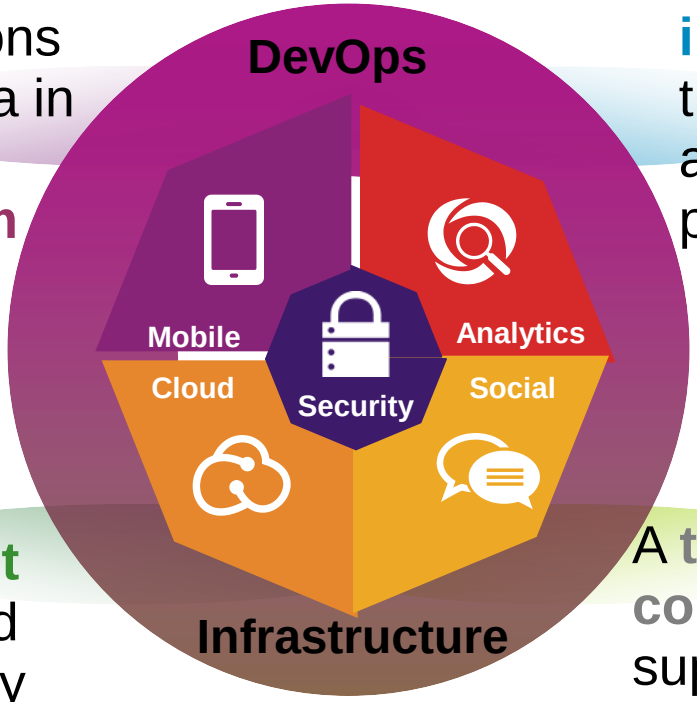
Create a competitive advantage in the digital era

Operational and analytics applications reside with the data in **a single fully virtualized system**

Creating **Intelligent interaction** in transactions integrated across mobile & core processes



A **flexible and robust** infrastructure for rapid delivery of high quality services

A **trusted computing** platform to support secure growth in transactions and data

…make the extraordinary possible!!!

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System z: An optimized design which delivers unique value

Comprehensive integration enabling information-centric computing

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Java 8 and z13: Optimized CICS, IMS, and DB2 transactions

Up to 50%
improvement for generic applications

Up to 2X
improvement in throughput per core for security enabled applications

- **Up to 76% improvement** in throughput from z13 (SMT, SIMD, CPACF and more)
- **Up to 42% improvement** in throughput from IBM Java 8
- **Up to 60X improvement** with Java 8 exploiting z13 new SIMD vector hardware instructions for specific Java libraries and functions

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Compilers: z13 exploitation for increased performance

New

Enterprise COBOL for z/OS v5.2

- Leverage SIMD instructions to improve processing of certain COBOL statements
- Increased use of DFP instructions for Packed Decimal data
- Support COBOL 2002 language features: SORT and table SORT statements
- Allows applications to access new z/OS JSON services

Up to **14%** reduction in CPU time*

Enterprise PL/I for z/OS v4.5

- Leverage SIMD instructions to improve code for SEARCH and VERIFY
- Raised string size from 32K to 128M
- Improved middleware support
- Provide full support for JSON (Parse, Generate, and Validate)
- Addressed 28 RFE's

Up to **17%** reduction in CPU time*

z/OS XL C/C++ V2R1M1

- Vector/SIMD support (option, datatype, and built-in functions)
- High performance Math Libraries specifically tuned for z13
- New support for inline assembly (GNU compatibility)
- New Debug support for Vector/SIMD data type

Up to **17%** increase in throughput*

* The performance improvements are based on internal IBM lab measurements. All benchmarks were optimized and executed on zEC12 and z13, and built using the highest optimization level. Performance results for specific applications will vary, depending on the source code, the compiler options specified, and other factors.

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CICS and z13

IBM z13: built for the needs of digital business and designed for the mobile generation

24% reduction in CPU per transaction seen in CICS on z13 for internal CICS VSAM benchmark compared with zEC12

31% improvement in ITR for the same workload

35% reduction in CPU/tran for an internal workload using SSL over HTTP with persistent sessions, leveraging z13 CPACF

Over 30% reduction in CPU/tran in CICS for internal CICS-DB2 benchmark

Please Note: Performance is based on measurements and projections using standard IBM benchmarks in a controlled environment. The actual throughput or performance that any user will experience will vary depending upon many factors, including considerations such as the amount of multiprogramming in the user's job stream, the I/O configuration, the storage configuration, and the workload processed. Therefore, no assurance can be given that an individual user will achieve results similar to those stated here.

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z/OS V2.2 and IBM z13 Provide Synergies

Meet the challenges of cloud, analytics and mobile workloads

The world's premier transaction and data engine enabled for the mobile generation

Driven by security, resiliency, and the economics of scale

- Strengthened security – encrypt **2X** as fast with CPACF on IBM z13™ (z13)*
- Signed audit records to help improve compliance
- Crypto cards now shareable by 85 LPARS – more than a **5X** increase

An integrated transaction and analytics system for real-time insights

Powered by data serving, analytics, powerful batch

- Selected key z/OS ATLAS 3.10.0 functions are accelerated using SIMD instructions and demonstrate up to **80%** higher throughput on z13 than on zEC12.***
- For eligible data, store up to **4X*** more data with zEDC
- Improve performance of many mobile, cloud, and analytics applications running on z13 with SIMD with Java® SDK 8

The world's most efficient and trusted cloud system that transforms the economics of IT

Fueled by server scale, large memory, high availability and resiliency

- **141-way** support on z13, approximately **40%** more cores than IBM zEnterprise® EC12 (zEC12)
- Up to **4TB** memory
- An average capacity improvement of **38%** compared to zEC12 Including use of SMT for zIIPs**

- **Improved Simplification**
- **z/OSMF now included with z/OS**
- **Easier operations**
- **Superior economics for an improved migration period**

*These results are based on projections and measurements completed in a controlled environment Results may vary by customer based on individual workload, configuration and software levels

The z13 provides lower overall mainframe costs through the ability to process more workload on larger zIIPs with an average capacity improvement of **38% compared to zEC12 including the exploitation of the new multithread option on the z13 zIIP.

***This claim is based on results from internal lab measurements. The double precision function improvement is derived from comparisons of a select set of commonly used z/OS ATLAS 3.10.0 functions executing on z13 to the equivalent functions executing on zEC12. A subset of these functions is accelerated using SIMD instructions on z13 The SIMD benefit is demonstrated using this subset. The performance improvements achieved will vary depending on the workload and other factors. .

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Open technologies with Linux

SMT technology on z13	Up to **38%** improvement in core performance	Up to **20%** more virtual servers per core
IBM Spectrum Scale	Disaster recovery solution for mission-critical workloads	
KVM	New industry-standard hypervisor (SOD)	
zAware for Linux on z	IT Analytics for improved availability	
Elastic Storage for Linux on z Systems	Enables new class of workloads	
PostgreSQL and Docker	Open support extended with PostgreSQL and Docker support	

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Mobile workloads Impact Systems than web workloads.

- Increase in peak and off-peak transactions. Expect 10-50% growth as you add a mobile channel.
- Increased query or “read-only” transactions. As many as 50% of mobile transaction could be “read-only”.
- Unanticipated spikes in workload due to popular apps, features or special offers. No traditional times for workload spikes.
- Inefficient applications written by “non-professional” coders. Drives up transaction rates.

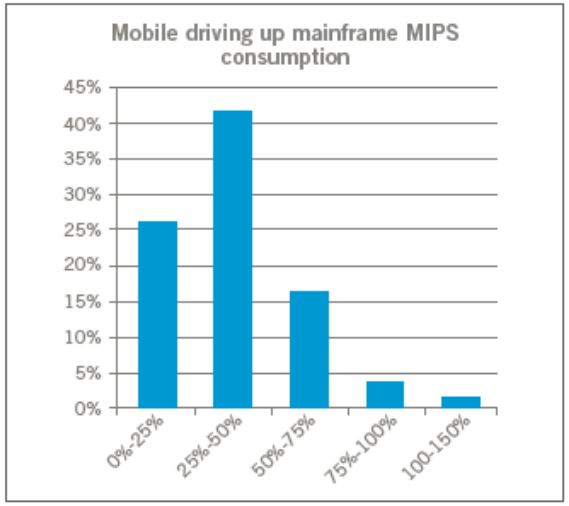

Chart 7: The increased use of mobile applications has increased MIPS consumption by more than two-fifths (41 percent), with 2 percent saying it has more than doubled.

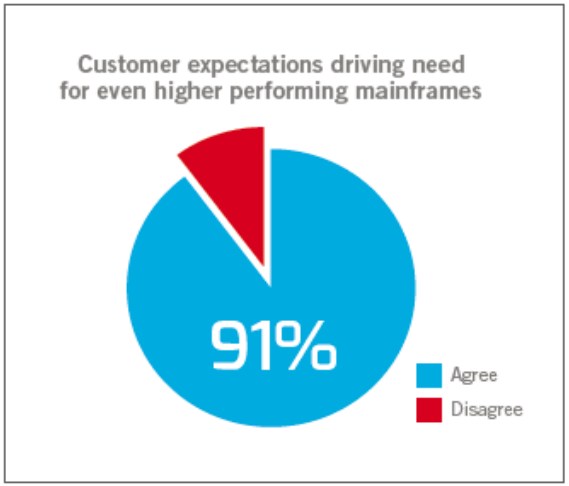

Chart 4: 91 percent of CIOs say now that customer-facing applications are using the mainframe and performance expectations on it have increased.

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The System z mobile development lifecycle

Design & Develop

Worklight Foundation
Rational Developer on System z

Instrument

Arxan Application Protection for IBM Solutions
Fiberlink MaaS360
Trusteer

Obtain Insight

Worklight Foundation
Tealeaf.
DB2 Analytics Accelerator

Integrate

Worklight Foundation
z/OS Connect
Cast Iron
DataPower
API Management
MQ/MQTT, MessageSight
IBM Integration Bus

Manage

Worklight Foundation
Fiberlink MaaS360
API Management

Test

Rational Test Workbench
Worklight Mobile Quality Assurance

Has a z Systems part number

Deploy

Worklight Foundation
UrbanCode Deploy

Scan & Certify

AppScan including Worklight Application Scanning

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Solutions to accelerate connecting mobile devices to z Systems

- New — End-to-end reference architecture for mobile on z Systems from MobileFirst platform to CICS and IMS
- New — z Systems end-to-end mobile Security architecture
- New — IBM Mobile Center of Competencies worldwide (Poughkeepsie, Tokyo, Bejing, Boeblingen, Montpellier)
- New — Apple iOS apps package with GBS implementation services for z Systems
- New — Sample MobileFirst applications for CICS, IMS, z/OS Connect

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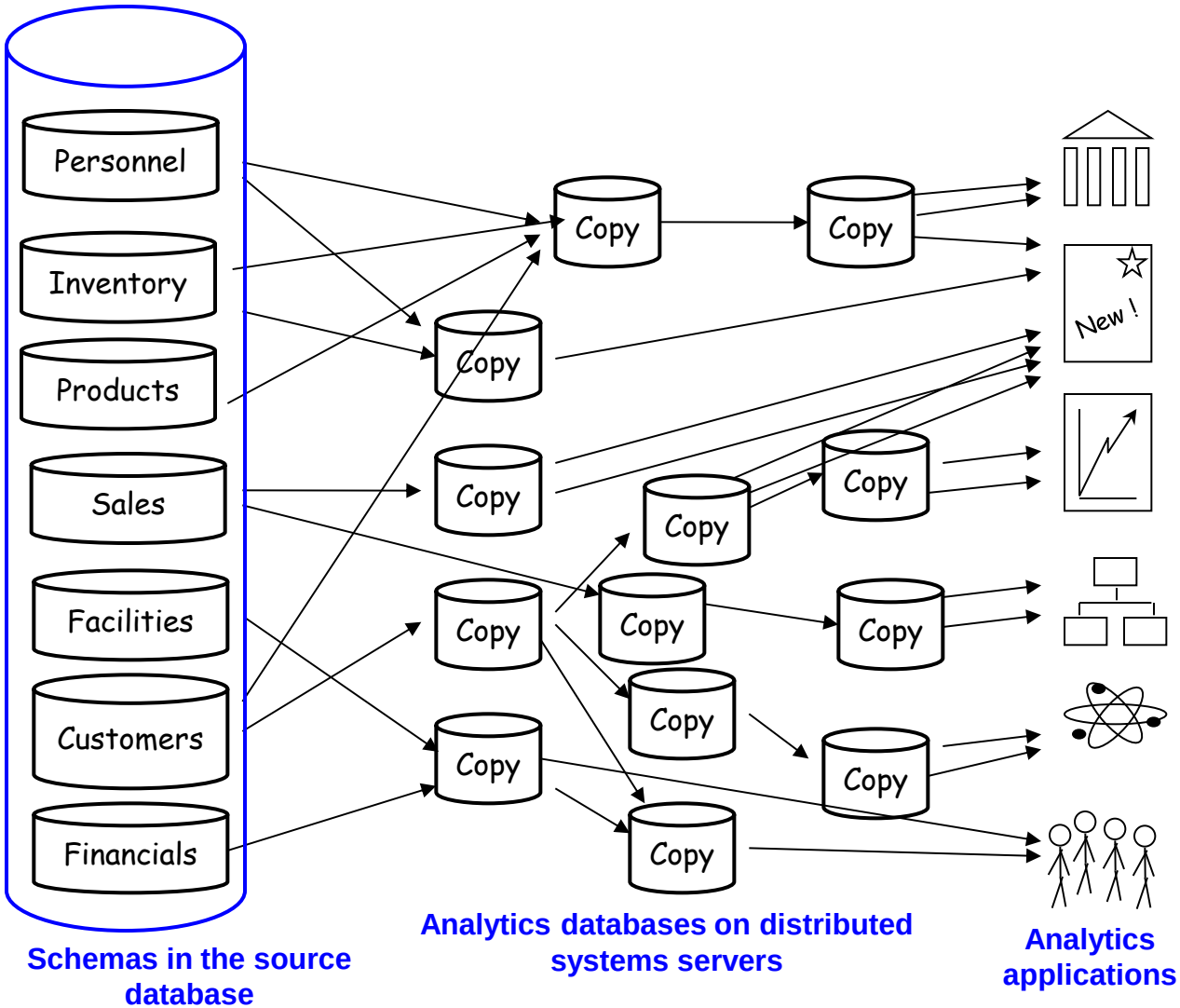
Traditional Analytics Approach



Problems:

- Data latency: time between transaction and insight
- Expensive, resource-intensive data replication processes
- Greater risk of data security breaches
- Data governance issues: copies of data can become inconsistent – do users trust the data?
- Data currency challenges: copies of data can become out-of-date – users demand timely data
- Proliferation of data silos impedes integration, reduces value derived from data assets

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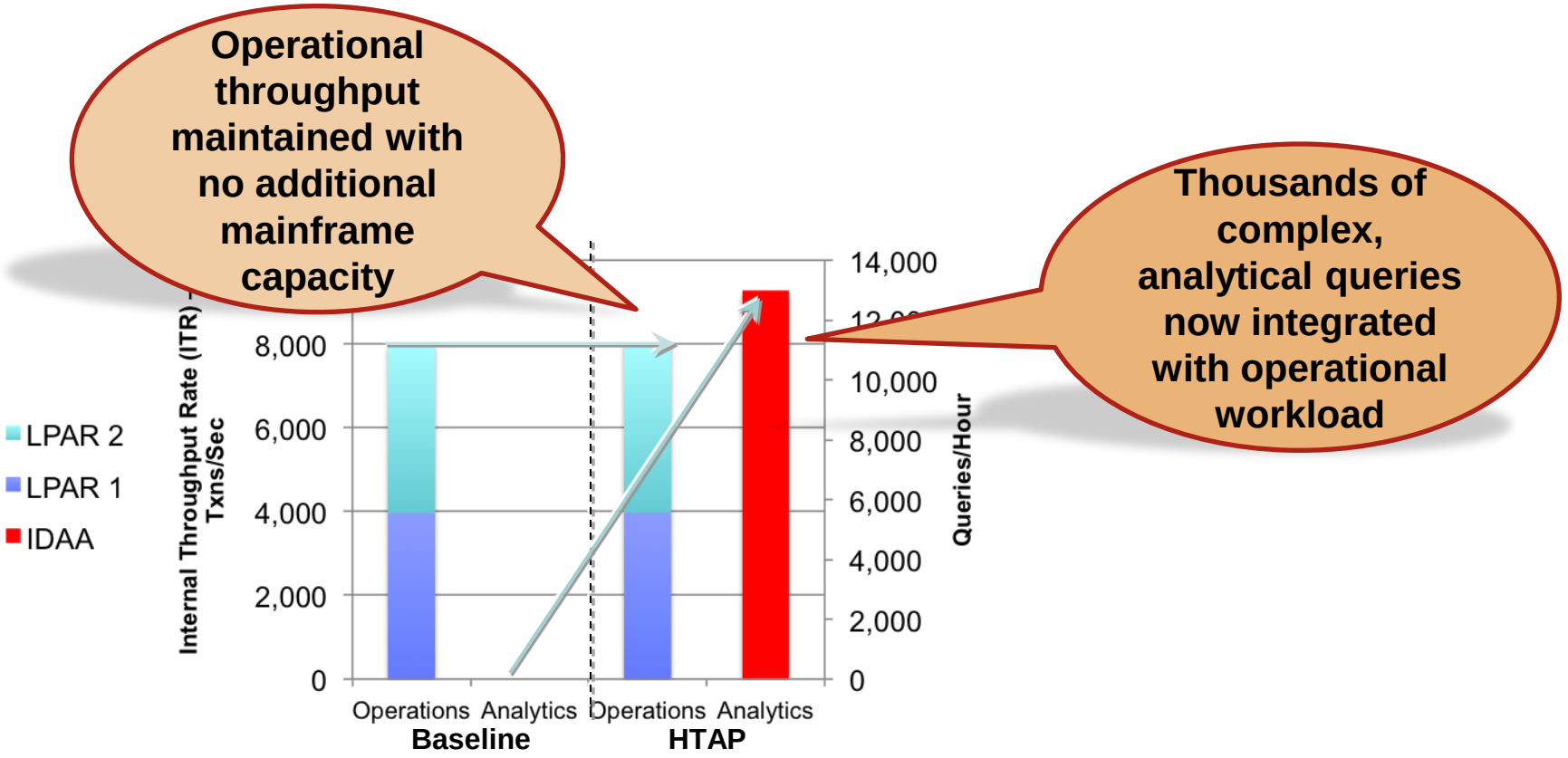
OLTP and analytics co-location

Benchmark Results



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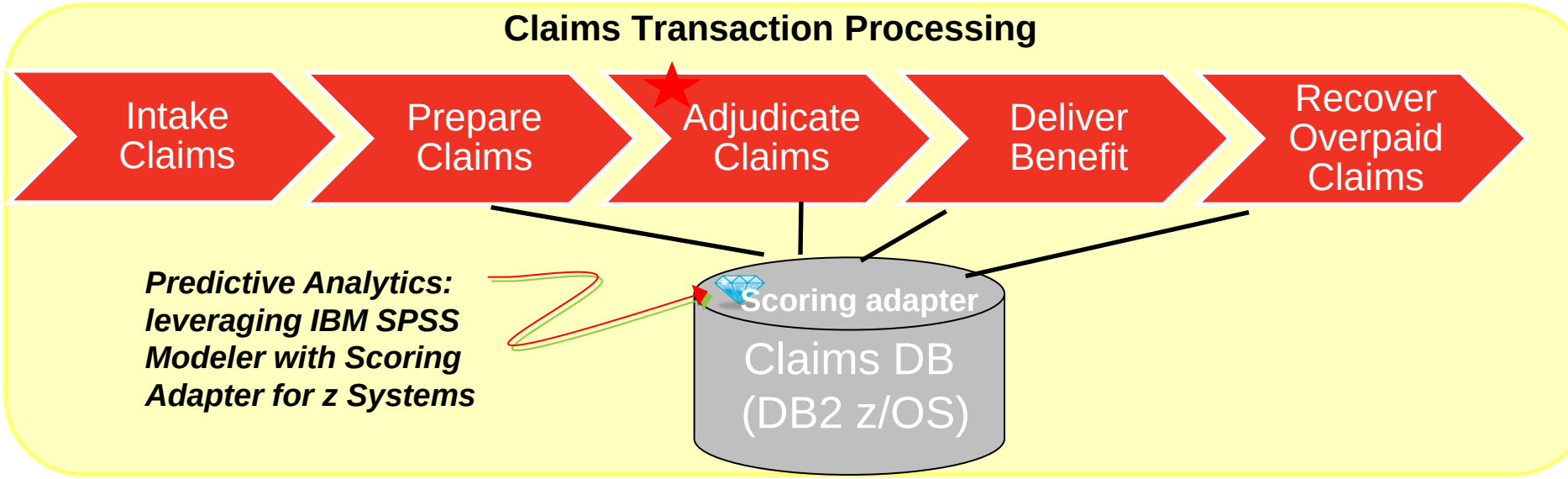
What does in-process scoring mean?



- Use predictive analytics to determine likelihood that a claim will be overpaid, appealed, etc. before the claim is paid, reduce pay-and-chase
- Use unique z Systems integration of real-time predictive analytics with DB2 z/OS to ensure the analytics will not impact claims throughput per day
- Demonstrated high levels of scale, low IT consumption and extremely fast real-time response times in customer engagements and internal demos
- Healthcare Insurance Demo using real-time scoring: http://youtu.be/_vII97Ylq0Y

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Example: How pre-payment analytics can reduce costs

Pre-payment predictive models can:

- Target currently un-recovered over-payments
- Find potential over-payment prior to payment, avoiding cost and risk in recovery process
- Avoid post-payment recovery situations where legitimate submitters have accidently miscoded, helping to preserve valued relationships with clients

Base Assumptions – can vary

Claims per day	500,000
Claims auto-adjudicated	90%
Claims auto-paid per day	450,000
Avg payout per claim	$50
Total payout per day	$22,500,000
Incorrectly paid rate	1%
Claims incorrectly paid	4,500
Potential to be collected/saved per day	$225,000

Post-payment collection			Pre-payment predictive analytics	
Cost of collection per claim	$25	⟺	$0	Cost of collection per claim
Success rate	50%		90%	Success rate
Amount RECOVERED (50% of $225,000)	$112,500	⟺	$202,500	Amount NOT PAID (90% success rate out of $225,000)
Cost to recover claims ($25 per claim recovered)	$56,250		$0	Total cost to collect – overpayment not made
Total amount RECOVERED	$56,250	⟺	$202,500	Total amount NOT PAID

Potential savings per day $146,250

Potential savings per year $53Million+

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Easy to deploy, simple to use Cloud Management Solution

New

IBM Cloud Manager with OpenStack for z Systems

Heterogeneous and integrated management support

- z Systems managing Power and x86 servers
- Central management across multiple hypervisors & domains
- All IBM server architectures & major hypervisors supported

Accelerated time to market with pattern support

- Chef-based patterns based on OpenStack Heat pattern engine is now supported on z Systems
- Workload deployment based on patterns speeds delivery of new services

Hybrid Cloud support

- Hybrid Clouds on and off premise options via SoftLayer support

openstack™

CHEF™

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Quickly build out complex cloud workl instances on z Systems

New

- **Reduce deployment error/fix**
- **Reduce need for deep product skills**
- **Improve quality of delivery**
- **Reduces operating and capital expenses**

More

patterns to be delivered in 2015

2 patterns1

for key z System portfolio

- WAS ND
- WAS Liberty
- ODM Decision Server
- ODM Decision Center
- Integration Bus
- DB2
- Business Process Server
- Business Process Center
- Business Monitor
- WebSphere Portal
- WebSphere MQ
- MobileFirst Platform

Up to **80%**

reduction in multi-product deployment

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Mobile Workload Pricing (MWP)

Announced and Available in 2014

- **Mobile Workload Pricing (MWP) -** Mitigates impact of Mobile workload on MLC charges
  - Improves the cost of growth for mobile transactions processed in z Systems environments such as CICS, IMS, DB2, MQ, and WAS on all zEC12 and later machines
  - Transactions coming from Mobile Phones or Tablet devices have MSUs discounted by 60%
  - No major infrastructure changes required, no separate LPARs needed
  - Mobile Workload Reporting Tool (MWRT) available

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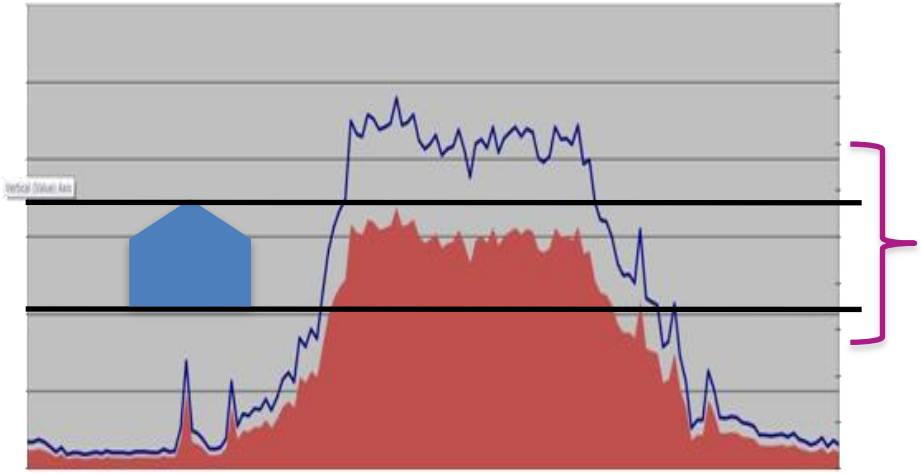
System z Mobile Workload Pricing

enables IT investments to scale with growth & business returns of mobile

No Infrastructure Changes Required

Improving the economics of mobile computing

NEW



Up to 60% reduction in incremental growth from mobile transactions

Enhanced sub-capacity reporting providing up to a 60% reduction in incremental peak workload growth resulting from mobile transactions.

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z Systems Collocated Application Pricing (zCAP)

To be Announced and Available in 2015

- **z Systems Collocated Application Pricing (zCAP) -** Run your systems the way you want to run them
  - For new applications, new workloads priced as if in a dedicated environment while technically integrated in LPARs with other workloads
  - Applicable to new applications coming to all zEnterprise and later machines, z196 through z13
  - zCAP eligible applications will have no effect on the reported MSUs for other sub-capacity middleware, and reduced impact on z/OS (adjusts MSUs similar to Mobile Workload Pricing)
  - zCAP enhancement to MWRT sub-capacity tool coming in 2015

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zCAP Illustration – Net New MQ Application

Net New MQ Example = 100 MSUs of new MQ workload *

1. Existing LPAR

MSUs used for subcap billing:

z/OS	1,000
DB2 and CICS	1,000

2. New MQ, standard rules

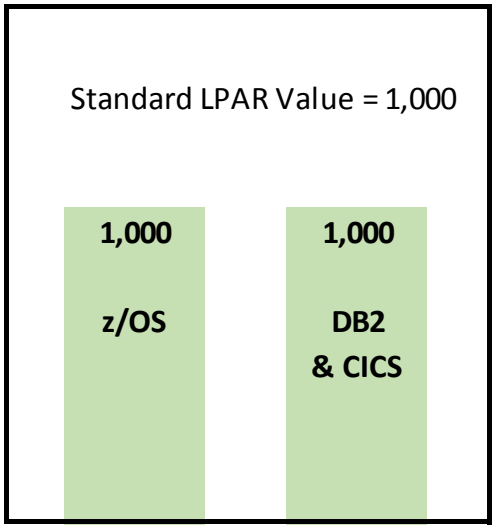
MSUs used for subcap billing:

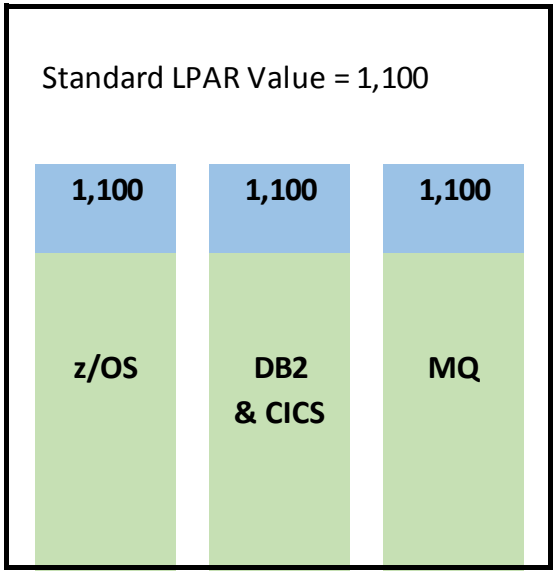
z/OS	1,100
DB2 and CICS	1,100
MQ (LPAR value)	1,100

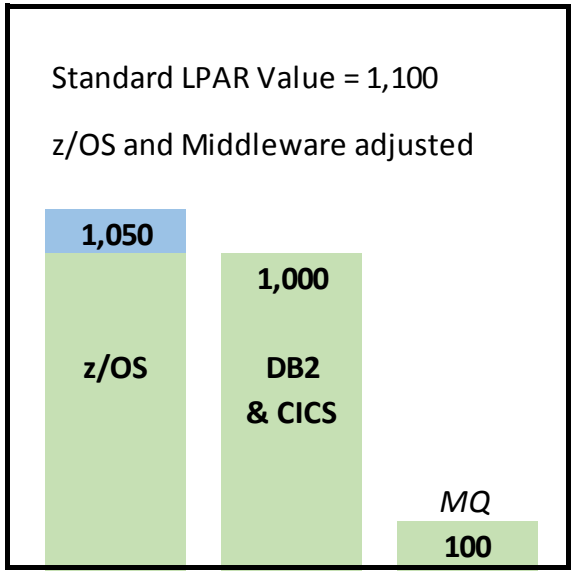
3. New MQ with ICAP pricing

MSUs used for subcap billing:

z/OS	1,050
DB2 and CICS	1,000
MQ (usage value)	100







* Assumes workloads peak at same time

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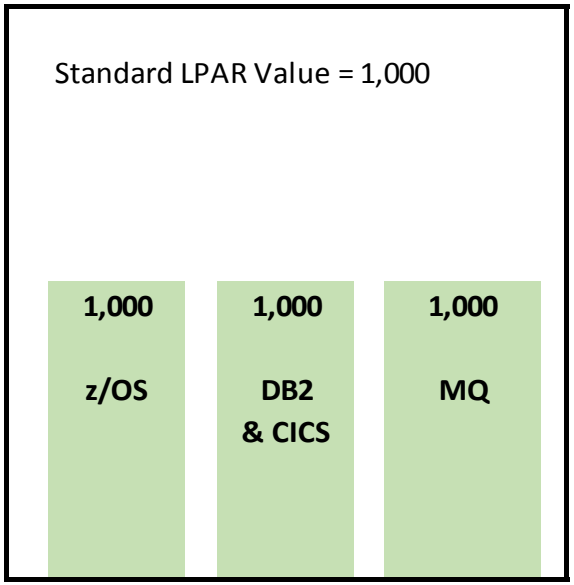
zCAP Illustration – Incremental MQ Growth

Incremental MQ Example = 100 MSUs of MQ growth *

1. Existing LPAR

MSUs used for subcap billing:

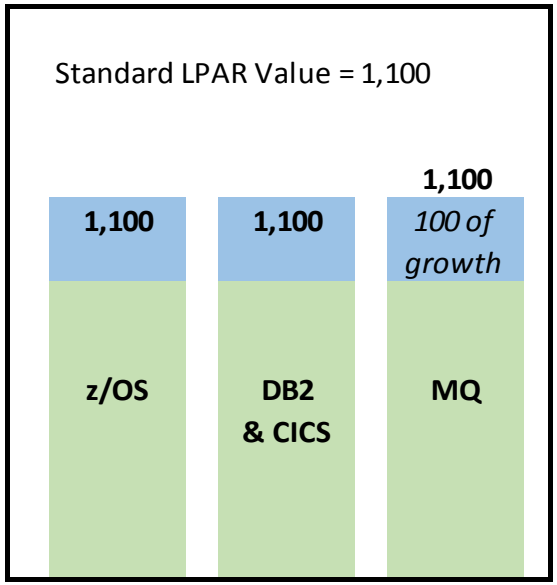
z/OS	1,000
DB2 and CICS	1,000
MQ	1,000



2. MQ growth, standard rules

MSUs used for subcap billing:

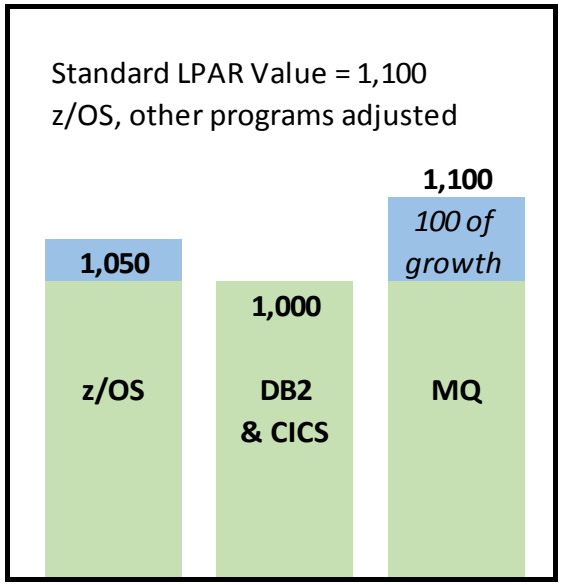
z/OS	1,100
DB2 and CICS	1,100
MQ w/growth	1,100



3. MQ growth with ICAP pricing

MSUs used for subcap billing:

z/OS	1,050
DB2 and CICS	1,000
MQ w/growth	1,100



* Assumes workloads peak at same time

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Country Multiplex Pricing

Country Multiplex Pricing – Shifting to greater flexibility and simplicity

- A Multiplex is the collection of all customer zEnterprise and later machines in a country
  - Applicable to all z196, z114, zEC12, zBC12, and z13 machines running z/OS or z/TPF
  - Older machines running z/OS or z/TPF disqualify a customer from Multiplex
  - Any machine running only z/VSE, z/VM, Linux has no effect upon Multiplex
- A **new** way of measuring and pricing MSUs,
- New Multiplex sub-capacity reporting tool coming
  - Program MSUs measured across all LPARs on all machines simultaneously to find monthly peak
- Unprecedented flexibility to move and run workloads anywhere and to migrate to new hardware
  - Elimination of duplicate sub-capacity peaks when workload moves between machines
  - Elimination of Sysplex aggregated pricing rules (e.g. 50% rule)
  - No more Cross Systems Waiver (CSW) 90-day limit from the Code 20 date
- Software migrations also greatly simplified
  - Old Single Version Charging (SVC) process replaced by Multiple Version Migration terms
  - No time limit for version migrations, multiple versions reported with concurrent peaks
- Cost of growth is reduced … one price per product for growth anywhere in the country
  - New price metric curve: Country Multiplex License Charges (CMLC)
- For each customer selecting Multiplex Pricing there will be a required pricing transition, shifting to this new Multiplex model is about growth and flexibility going forward
  - Existing Baseline at the original price + Growth at a new price

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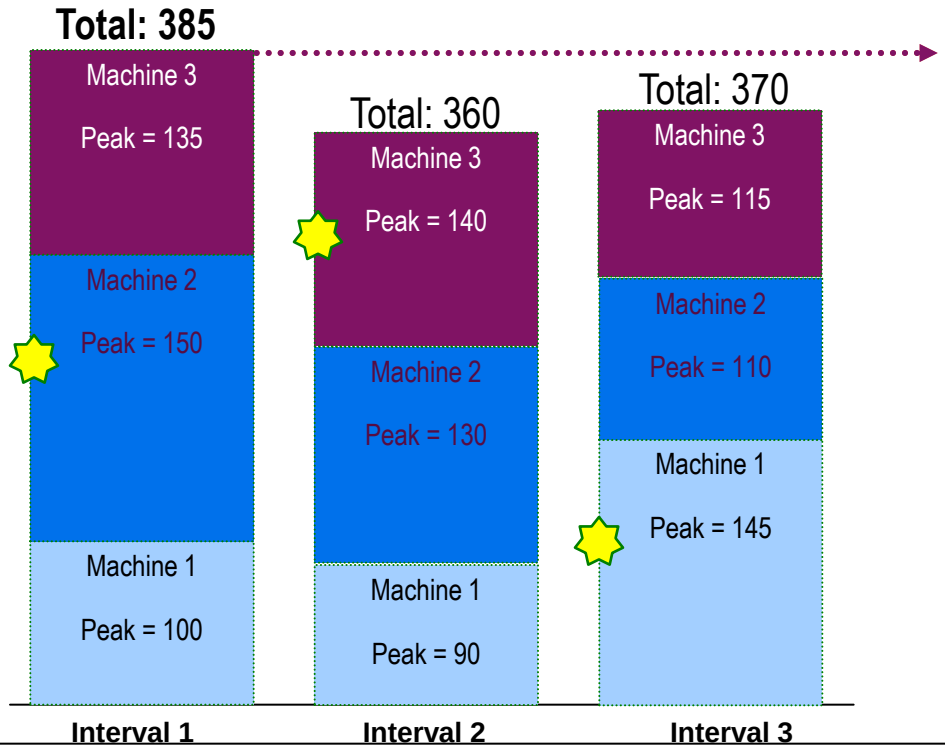
Multiplex MSU Peak Reporting Illustration

- Each bar represents MSU measurements for a given time interval
- Assuming there were only 3 intervals in the month, then SCRT and Multiplex peak values would be:

Traditional Sub-Capacity Peak = Sum of individual SCRT machine peaks for the month:

Machine 1: 145
Machine 2: 150
Machine 3: 140

Sum of Peaks: 435



Multiplex Peak = Peak value of the hourly simultaneous totals of all machines
Peak of Simultaneous Totals: 385

Reporting dynamics
Multiplex MSUs will be ***at or below SCRT values*** due to the smoothing effect of measuring all machines at the same time intervals

Allows for dynamic workload movement with no duplicate MSU peaks since machine boundaries are no longer critical

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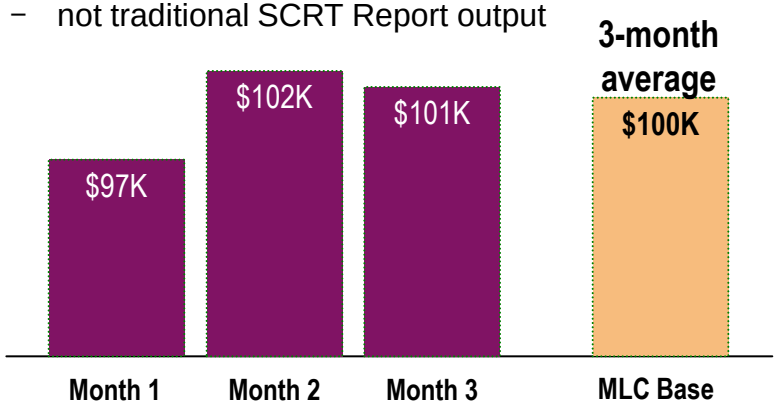
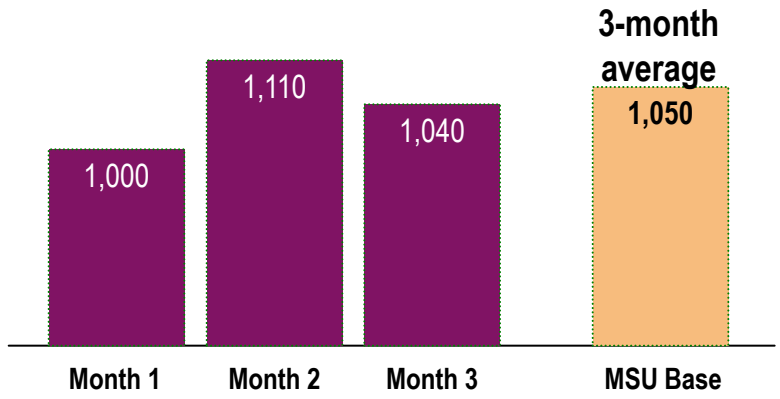
Multiplex MLC & MSU Base Illustration

Setting the initial MLC Base & MSU Base (one-time exercise)

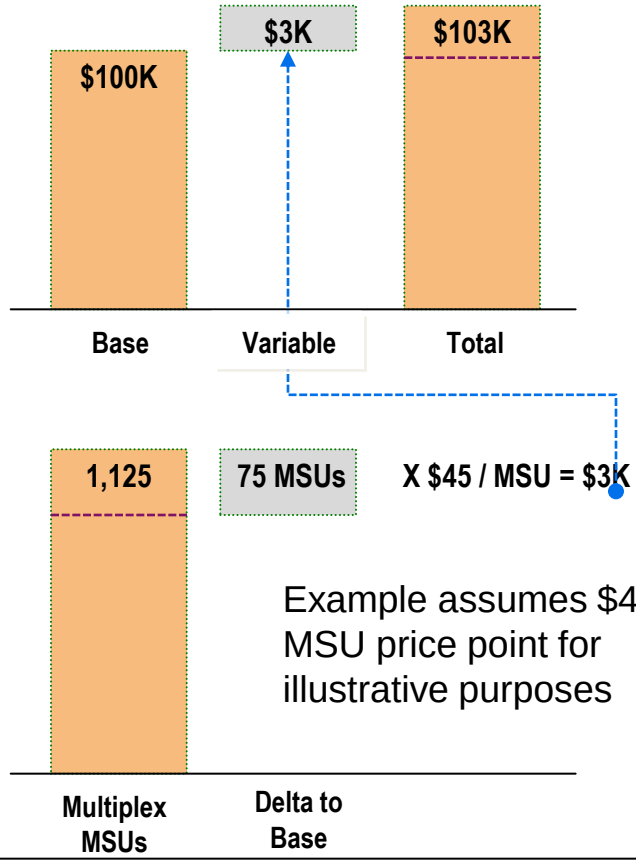
- MLC & MSU bases set for each subcapacity product
  - *Most recent 3-month average*
- MSU Base set with new Multiplex Report output
  - not traditional SCRT Report output





Ongoing MLC Reporting & Billing Example (monthly process)

- For each product, monthly MLC charges equal to base plus variable charge
- Variable charge = Delta MSUs vs. MSU base (up or down), multiplied by applicable price per MSU



Example assumes $45 per MSU price point for illustrative purposes

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Thank You

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