Aktuelles zu IBM System z Hardware, z/VM, z/VSE und Linux on System z

Bad Reichenhall, Nov 2006

Dr. Klaus Goebel
z/VSE Systems Manager
IBM Labor Böblingen

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Agenda

§ **IBM System z9 EC/BC**

§ **z/VM and Linux on System z**

§ **z/VSE V4**

§ **New Software Pricing with z/VSE V4**

IBM System z Family   New Announcement 04/2006

IBM eServer zSeries 900 – z900 (2064)

IBM eServer zSeries 990 – z990 (2084)

IBM System z9 109 z9-109 (2094)

IBM System z9 Enterprise Class – z9 EC (2094)

IBM System z9 Business Class – z9 BC (2096)

IBM eServer zSeries 800 – z800 (2066)

IBM eServer zSeries 890 – z890 (2086)

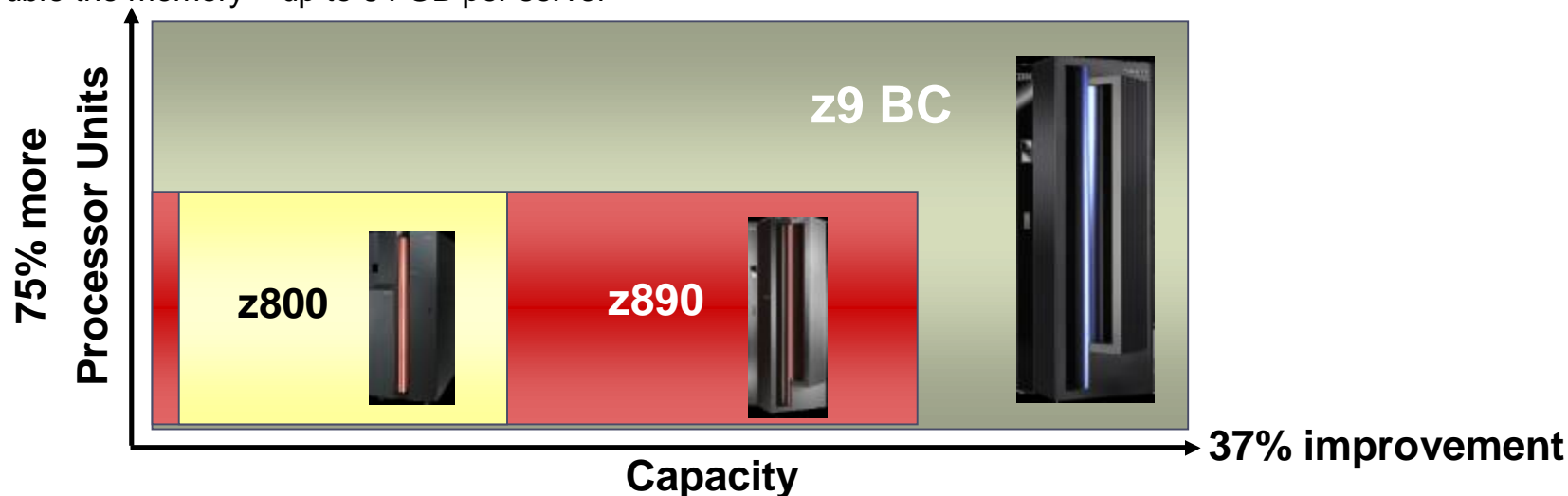# z9 BC – Delivering increased capacity and performance
Flexibility for growth
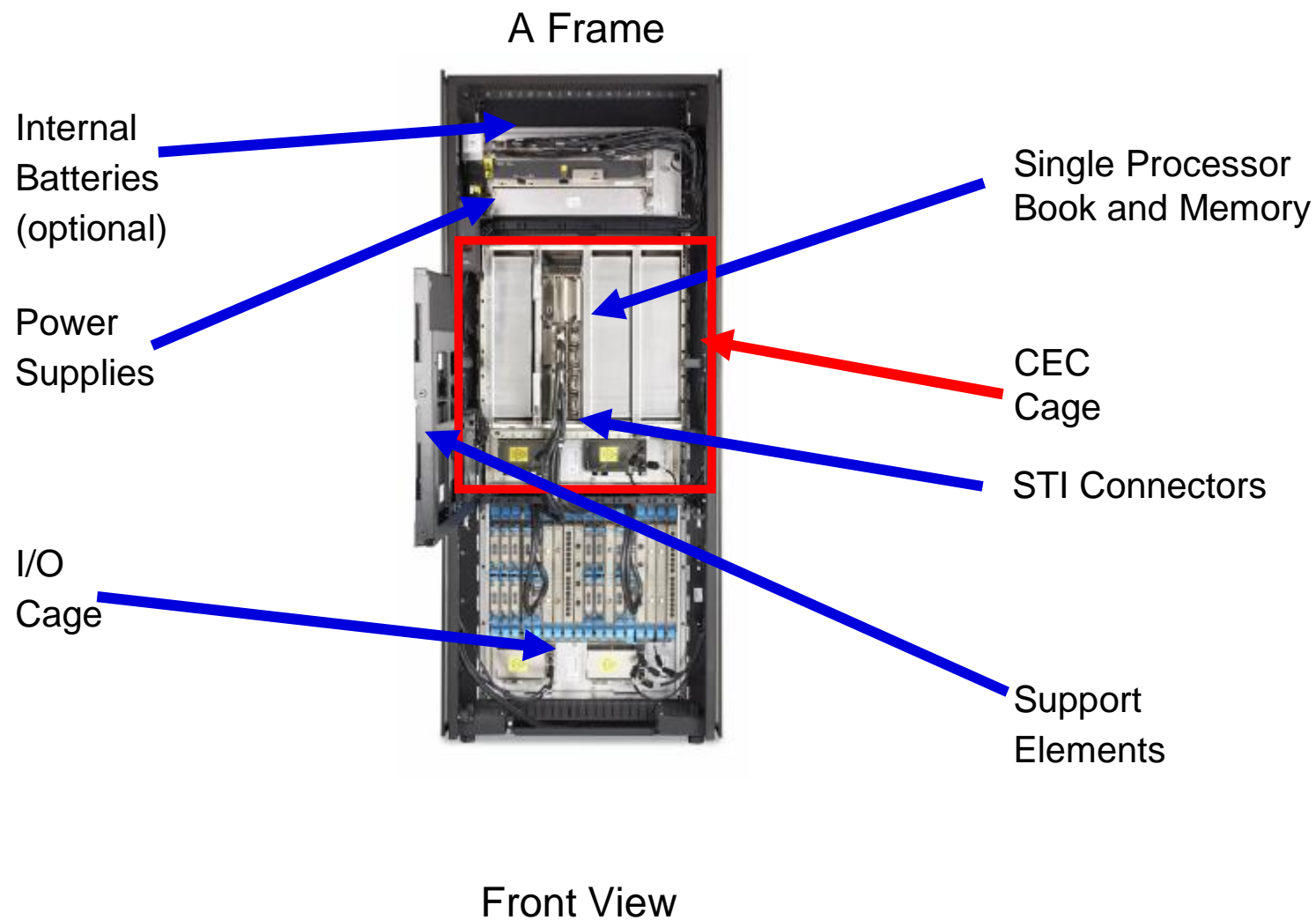
§ **Greater granularity and scalability**

- ► Two models with one machine type (2096)
  - ● 1 to 4-way high performance server standard engines
  - ● Entry model with 1 to 3-way standard engines
  - ● Up to a 7-way with specialty engines
- ► 73 capacity settings for a 2.6 times increase in flexibility over IBM eServer™ zSeries® 890 (z890)
- ► Delivers over 37% more capacity with the same low entry point as the z890
- ► Up to 37% hardware performance improvement for Linux ® (IFLs), Java™ (zAAPs) and coupling (ICFs)
- ► New zIIP for data serving workloads
- ► Double the memory – up to 64 GB per server
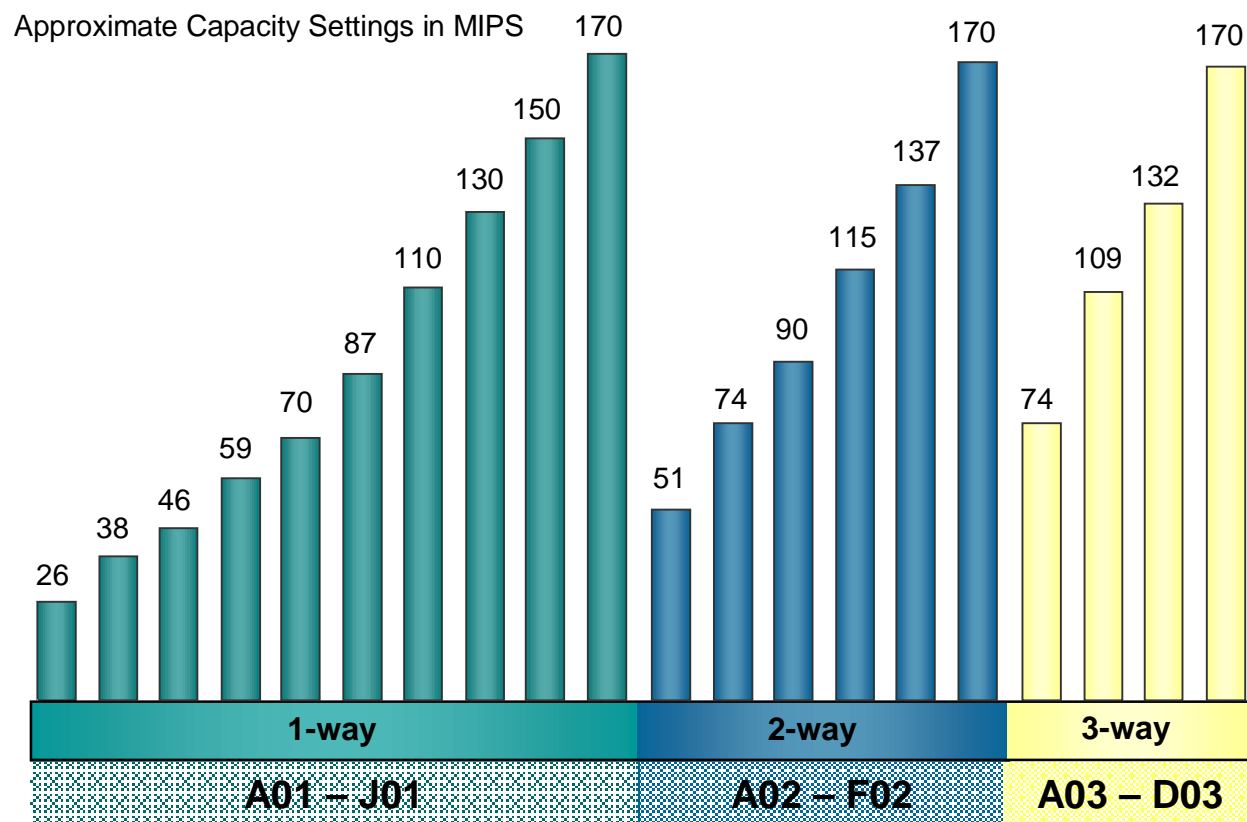
§ **Improved I/O Performance**

- ► 40% more FICON channels – up to 112
- ► Up to 170% more bandwidth than z890
- ► Can improve FICON performance with Modified Indirect Data Address Word (MIDAW) facility
- ► Double the FICON concurrent I/O operations from 32 to 64 on FICON channel
- ► Multiple Subchannel Sets (MSS) for an increased number of logical volumes

75% more Processor Units

z800 | **z890** | **z9 BC**

Capacity

37% improvement

z9 BC – Under the Cover

A Frame

Internal
Batteries
(optional)

Power
Supplies

I/O
Cage

Single Processor
Book and Memory

CEC
Cage

STI Connectors

Support
Elements

Front View

IBM Systems

z9 BC Model **R07** - Capacity and Performance Comparison

Approximate Capacity Settings in MIPS

1-way — A01 – J01: 26, 38, 46, 59, 70, 87, 110, 130, 150, 170

2-way — A02 – F02: 51, 74, 90, 115, 137, 170

3-way — A03 – D03: 74, 109, 132, 170

Note: For MSU values, refer to:
www-1.**ibm.com**/servers/eserver/zseries/library/swpriceinfo/
For ITRs refer to: www-1.**ibm.com**/servers/eserver/zseries/lspr/zSerieszOS.html

* CI = Capacity Indicator and refers to number of installed CPs and capacity setting as reported by STSI instruction. CI Z00 does not have any CPs.

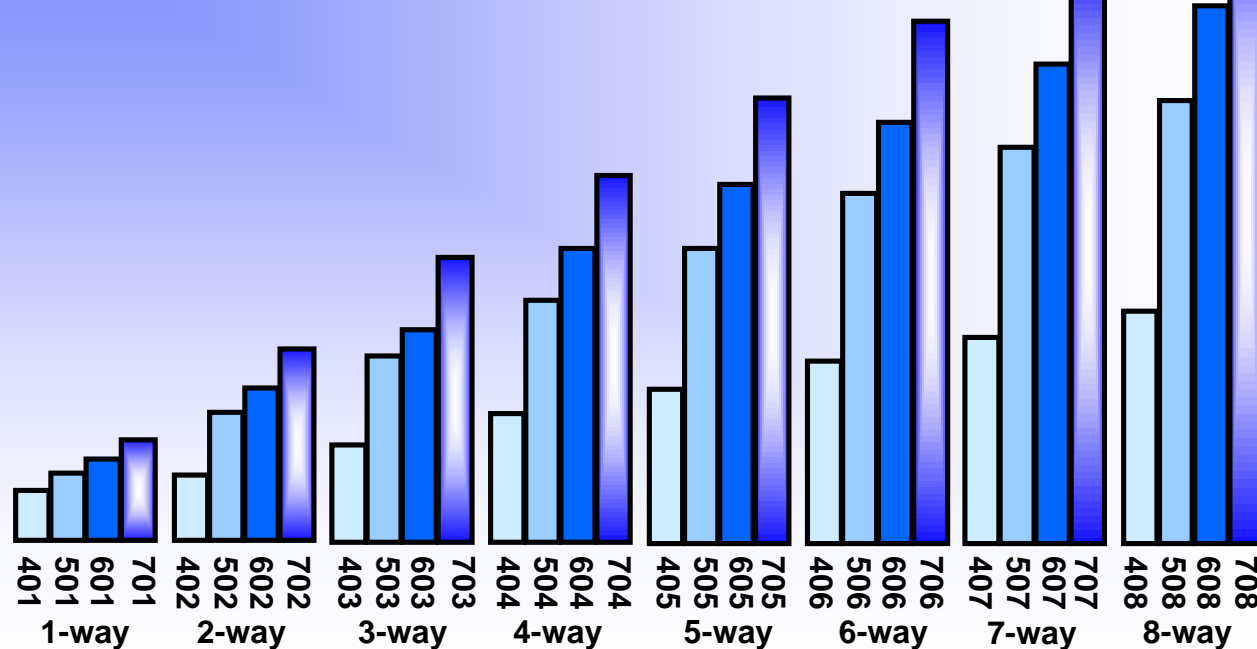# z9 BC Model S07 - Capacity and Performance Comparison
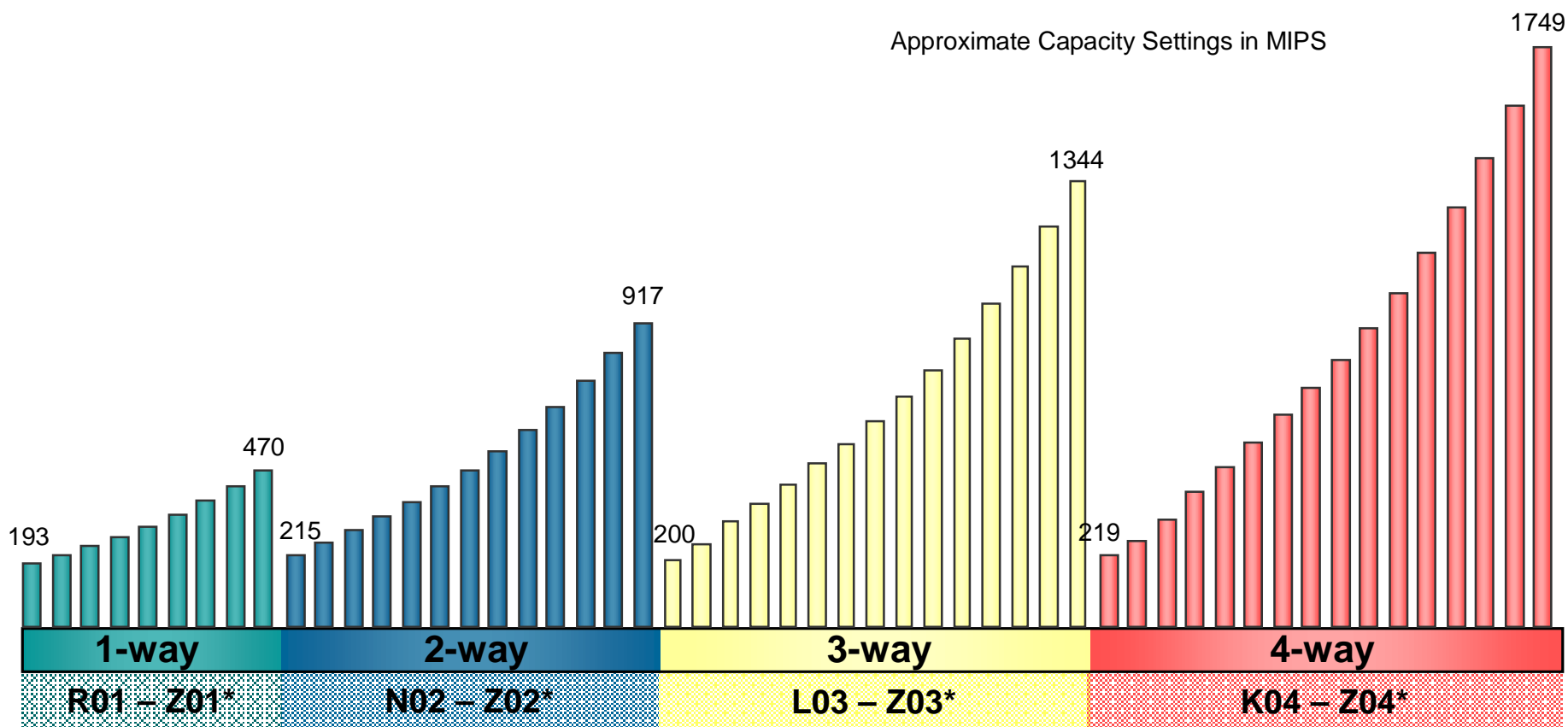
Approximate Capacity Settings in MIPS

1749

1344

917

470

193
215
200
219

1-way | **2-way** | **3-way** | **4-way**

R01 – Z01* | N02 – Z02* | L03 – Z03* | K04 – Z04*

Note: For MSU values, refer to:
www-1.**ibm.com**/servers/eserver/zseries/library/swpriceinfo/
For ITRs refer to: www-1.**ibm.com**/servers/eserver/zseries/lspr/zSerieszOS.html

* CI = Capacity Indicator and refers to number of installed CPs and capacity setting as reported by STSI instruction. Model CI Z00 does not have any CPs.

z9 EC - Capacity and Performance Comparison

Subcapacity servers

401	501	601	701	402	502	602	702	403	503	603	703	404	504	604	704	405	505	605	705	406	506	606	706
1-way				**2-way**				**3-way**				**4-way**				**5-way**				**6-way**			

§ The z9 EC will now offer 24 additional subcapacity settings with the first eight
general purpose (CP) engines

§ Entry point is approximately one third the capacity of the 701

§ All general purpose processors must be the same capacity within one z9 EC

System z9 EC and BC Operating System Support

Operating System	ESA/390 (31-bit)	z/Architecture (64-bit)
z/OS.e# Version 1 Release 4*, 5*, 6, 7, 8	No	Yes
z/OS Version 1 Release 4*, 5*, 6, 7, 8	No	Yes
Linux, 64-bit distribution	No	Yes
Linux, 31-bit distribution	Yes	No
z/VM Version 5 Release 1, 2	No	Yes
z/VM Version 4 Release 4**	Yes	Yes
z/VSE*** 3.1, VSE/ESA 2.7****	Yes	No
z/VSE V4***** (Preview – no GA announced)	No	Yes
z/TPF Version 1	No	Yes
TPF Version 4 Release 1 (ESA mode only)	Yes	No

\#   z/OS.e - z800, z890 and z9 BC only
*   Support for z/OS V1.4 and 1.5 will end March 31, 2007
**   Support for z/VM V 4.4 has ended on September 30, 2006
*** z/VSE V3 can execute in 31-bit mode only. It does not implement z/Architecture and specifically does not implement 64-bit mode capabilities. z/VSE V3 is designed to exploit select features of IBM System z hardware.
**** Support for VSE/ESA 2.7 will end February 28, 2007
***** z/VSE V4 is designed to exploit 64 bit real memory addressing, but will not support 64-bit virtual memory addressing
Note: Please refer to the latest PSP bucket for latest PTFs for new functions/features.

Agenda

§ **IBM System z9 EC/BC**

§ **z/VM and Linux on System z**

§ **z/VSE V4**

§ **New Software Pricing with z/VSE V4**

IBM Tivoli OMEGAMON XE on z/VM and Linux

§ **Preview announcement* made August 15, 2006**

§ **Combined product offering that monitors z/VM and Linux for System z**

§ **Provides work spaces that display:**

► **Overall system health**

► **Workload metrics for logged-in users**

► **Individual device metrics**

► **LPAR Data**

§ **Provides composite views of Linux running on z/VM**

§ **Supported on z/VM V5.2**

► **Requires the z/VM V5.2 Performance Toolkit for data collection**

§ **Planned availability: 4Q06**
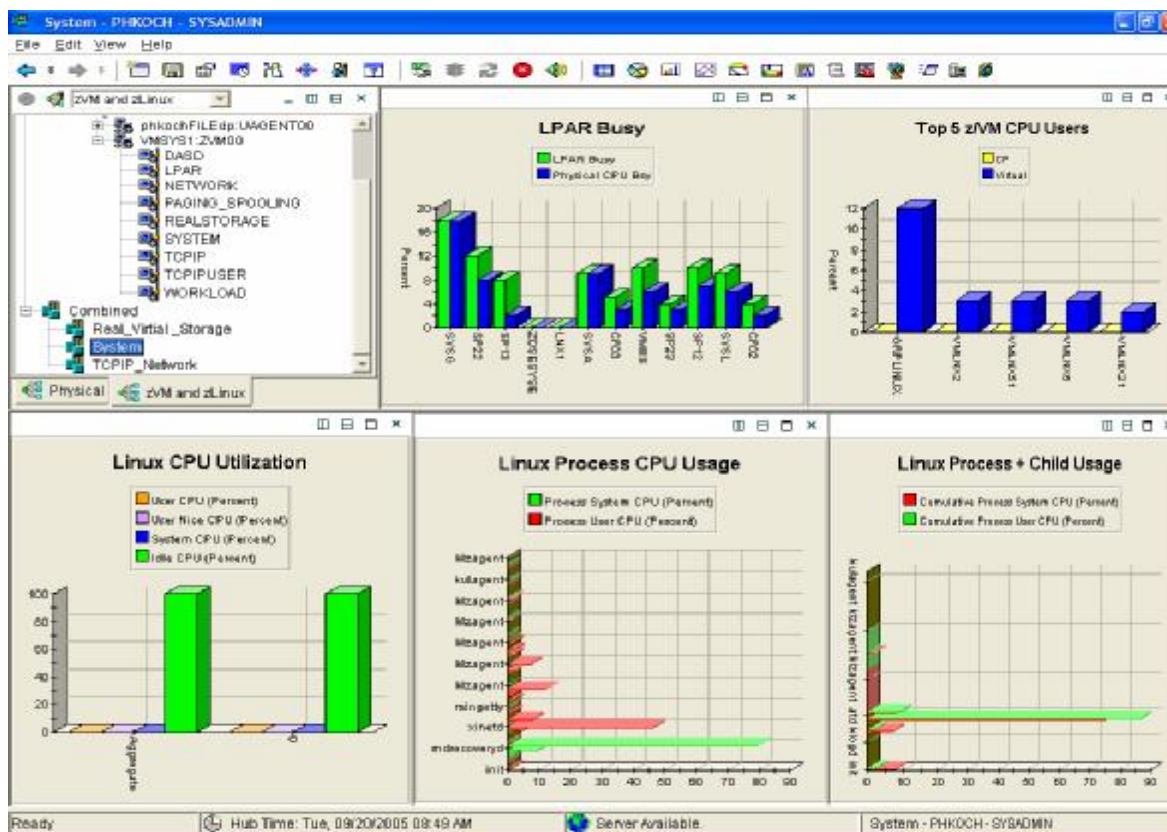
* Refer to IBM Software Announcement 206-201

Linux and z/VM Technology Exploitation
Collaborative Memory Management

§ <u>Problem scenario</u>: virtual memory utilization far exceeds real memory availability

§ z/VM Control Program paging operations become excessive

§ Overall system performance and guest throughput suffers

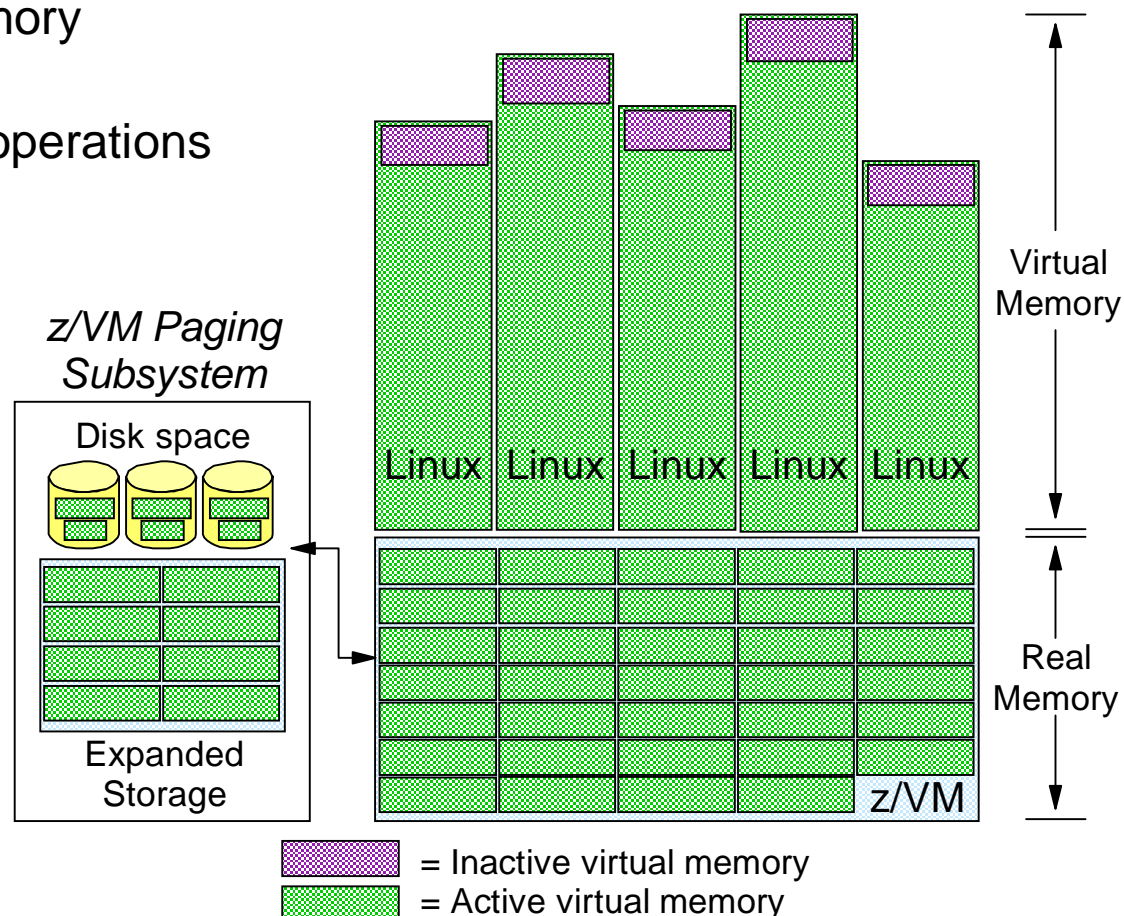*z/VM Paging Subsystem*

Disk space

Expanded Storage

Virtual Memory

Real Memory

Linux Linux Linux Linux Linux

z/VM

= Inactive virtual memory

= Active virtual memory

Chart 1 of 3

Linux and z/VM Technology Exploitation
VMRM Support for Collaborative Memory Management

§ <u>Solution</u>: real memory constraint detected and Linux images signaled to reduce virtual memory consumption

§ Linux memory pages are released

§ Demand on real memory and z/VM paging subsystem is reduced

§ Overall system performance and guest image throughput improves

§ z/VM V5.2 support available with PTF for APAR VM64085
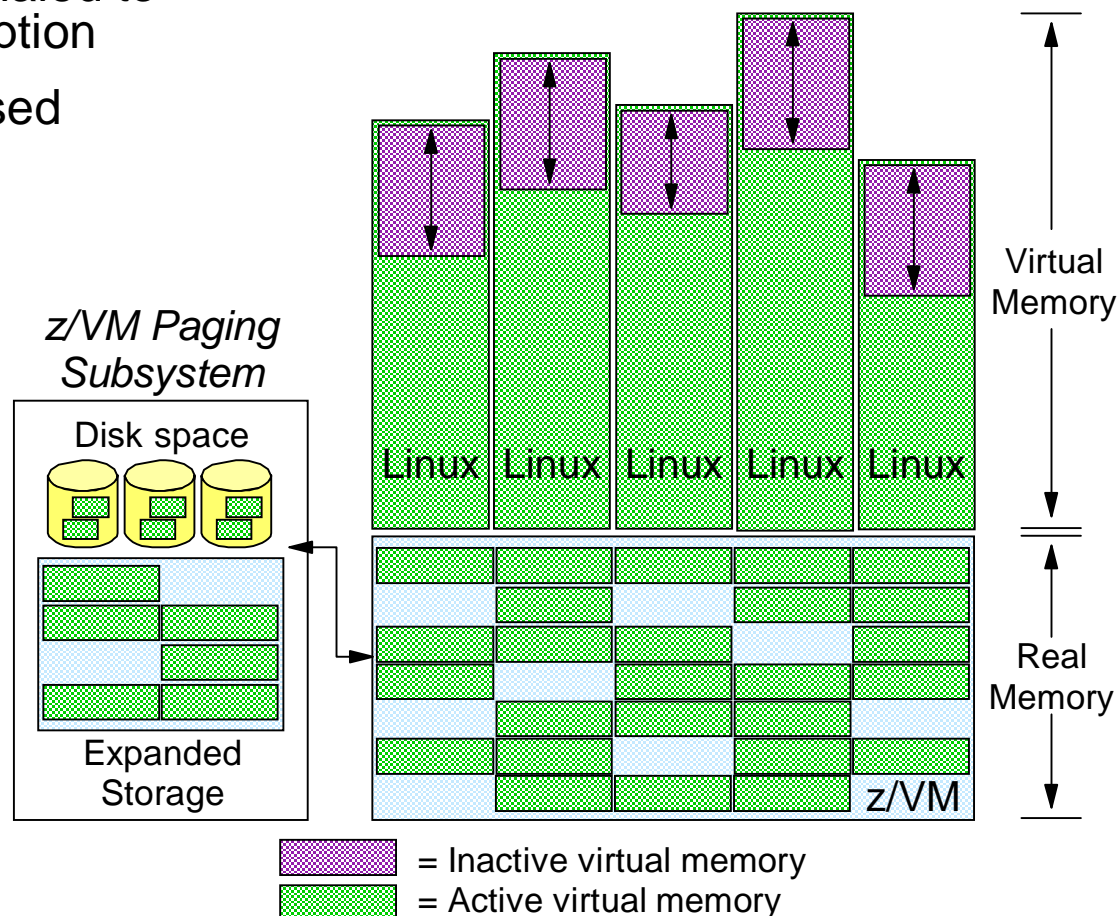
§ Linux support available with SLES9 and RHEL4.5

z/VM Paging Subsystem

Disk space

Expanded Storage

Linux   Linux   Linux   Linux   Linux

z/VM

Virtual Memory

Real Memory

= Inactive virtual memory
= Active virtual memory

Chart 2 of 3

Linux and z/VM Technology Exploitation
System z9 Support for Collaborative Memory Management Assist

§ <u>Solution</u>: exchange page usage information between Linux guests and z/VM

§ Reclaim "unused" pages at higher priority

§ Bypass host page writes for unused and "volatile" pages (clean disk cache pages)

§ Signal exception if guest references discarded volatile page

§ Use host page management assist to re-instantiate pages for next use

§ Supported by System z9

§ z/VM V5.2 support targeted for 4Q06 (via PTF)

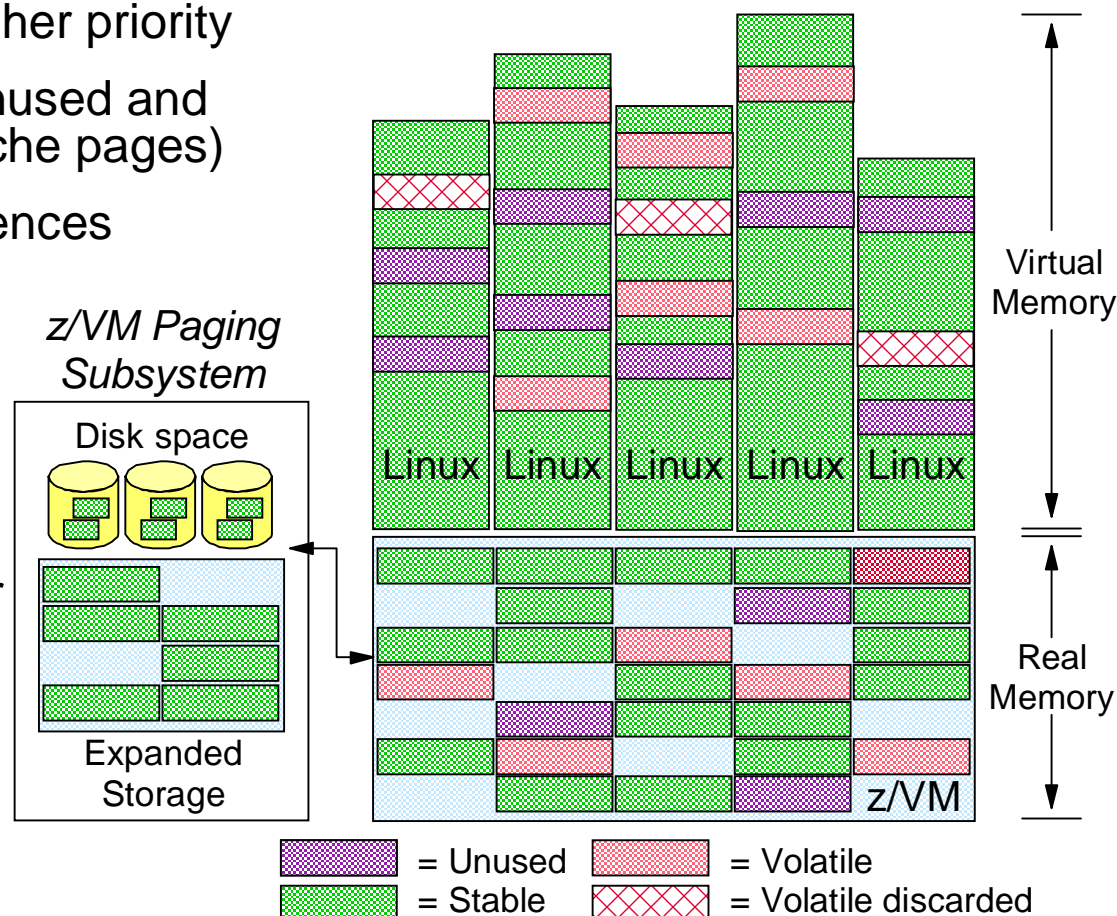§ IBM is working with its Linux distribution partners for exploitation support

Chart 3 of 3

z/VM Paging Subsystem

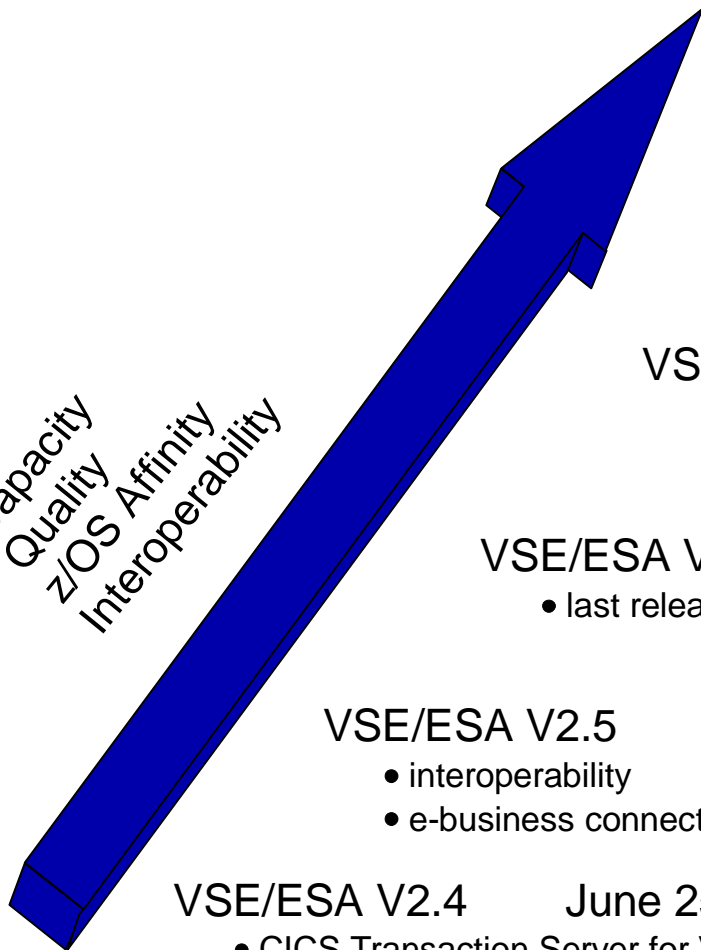Disk space

Expanded Storage

Linux Linux Linux Linux Linux

z/VM

Virtual Memory

Real Memory

= Unused   = Volatile
= Stable   = Volatile discarded

Agenda

§ **IBM System z9 EC/BC**

§ **z/VM and Linux on System z**

§ **z/VSE V4**

§ **New Software Pricing with z/VSE V4**

z/VSE Roadmap

z/VSE V4 - Preview
- z/Architecture only
- 64-bit real addressing
- SOD for sub-cap pricing

z/VSE V3.1   March 4, 2005
- zSeries features, FCP/SCSI
- 31-bit mode only

VSE/ESA V2.7   March 14, 2003
- enhanced interoperability
- ALS2 servers only

VSE/ESA V2.6   Dec 14, 2001
- last release to support pre-G5 servers

VSE/ESA V2.5   Sept 29, 2000
- interoperability
- e-business connectors

VSE/ESA V2.4   June 25, 1999
- CICS Transaction Server for VSE/ESA
- e-business

Capacity
Quality
z/OS Affinity
Interoperability

z/VSE

§Current Product: z/VSE 3.1

- z/VSE V3.1 (GA 3/2005)
- ESA/390 (31-bit) mode only
  - up to 2 GB real processor storage
- supports
  - System z9 EC *and* z9 BC
  - eServer zSeries 990, 890, 900, 800
  - **Multiprise 3000 & S/390 G5/G6**
- HiperSockets
- CPACF
- Crypto Express2 (configurable)
- FCP/SCSI disks & NPIV
  - DS8000, DS6000, ESS
- FICON Express2 & 4
- OSA Express2
- 31-bit buffers for ACF/VTAM
- SOD for TS1120 encrypting tape
- TCP/IP for VSE V1.5

§Future Product: z/VSE 4.1

- z/VSE V4.1 (Preview 4/2006)
- **z/Architecture (64-bit) mode only**
  - **up to 8 GB real processor storage**
- supports
  - System z9 EC *and* z9 BC
  - eServer zSeries 990, 890, 900, 800
- **New subcapacity pricing option (z9 only)**
- HiperSockets
- CPACF + **enhancements**
- Crypto Express2 (configurable)
- FPC/SCSI disk & NPIV + **point-to-point**
  - DS8000. DS6000, ESS
- FICON Express2 & 4
- OSA Express2
- 31-bit buffers for ACF/VTAM
- SOD for TS1120 encrypting tape
- TCP/IP for VSE V1.5

IBM TS1120 Tape Drive Encryption

The industry's first comprehensive end-to-end tape encryption solution

§ **First encrypting tape drive - IBM System Storage TS1100 tape drive family**

  ► **Standard feature on all TS1120 Tape Drives**

  ► **Chargeable upgrade feature for existing TS1120 Tape Drives**

§ **A new, innovative IBM Encryption Key Manager component for the Java platform™ component supported on a wide range of systems including:**

  ► **z/OS, i5/OS, AIX, HP, Sun, Linux (incl System z), and Windows**

§ **Integration with IBM tape systems, libraries**

§ **Enhancements to Tivoli Storage Manager to exploit TS1120 encryption**

§ **Integration with System z encryption key, policy management, security and cryptographic capabilities**

§ **Complements existing System z Encryption Facility for z/OS program product**

§ **New services and consulting for tape data encryption and key management**

TS1120
500 GB
100 MB/sec

Encryption Key Manager

IBM TS1120 Tape Drive Encryption – SOD for z/VSE

SOD*: *"z/VSE V3.1 support of the TS1120 Tape Drive with encryption is planned for first half 2007. It is also IBM's intent to support z/VSE V4.1 (when made available) using Systems Managed Encryption with the TS1120. z/VSE support will require the Encryption Key Manager component running on another operating system other than z/VSE using an out-of-band connection."*

Centralized key management

§ **Help protect and manage encryption keys**

  § **Highly secure and available key data store**

  § **Long term key management**

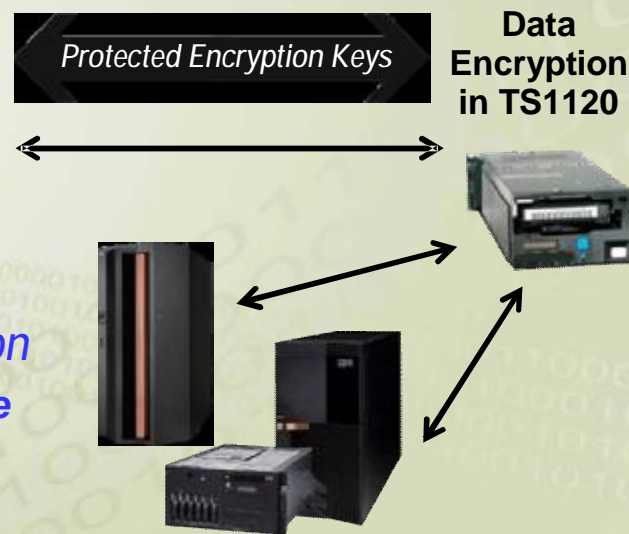 § **Disaster recovery capabilities**

§ **Single point of control**

  § **Non-VSE, Java-based platform**

  § **TCP/IP connection to tape control unit**

Data Encryption in the Server

Protected Encryption Keys

Data Encryption in TS1120

§ **Highly secure**
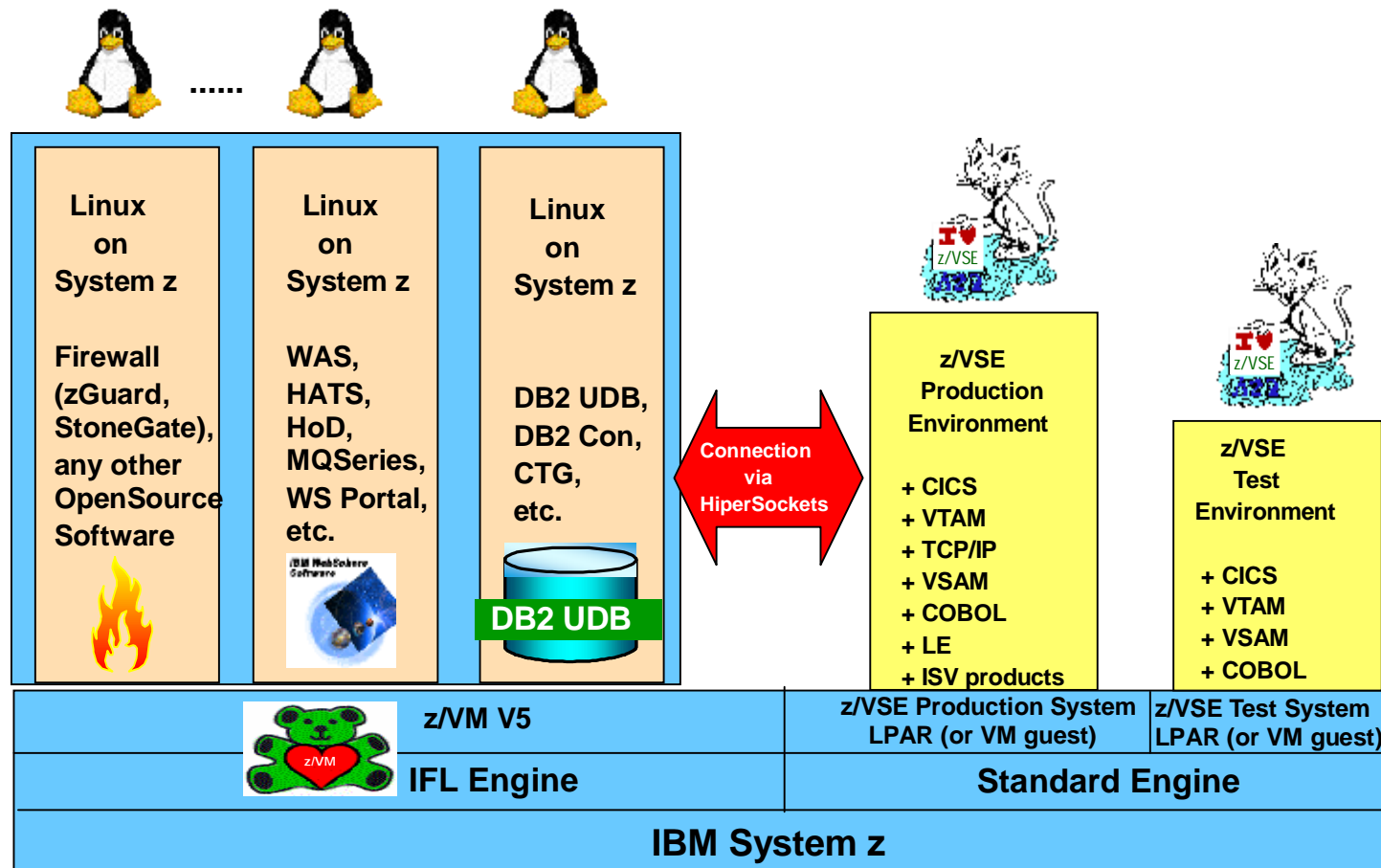
§ **High performance archive encryption**

§ **Transparent to existing processes and applications**

§ **Can help provide audit compliance**

TS1120 encryption
Enterprise scope

IBM Systems

Modernization & Growth with Linux on System z

Linux on System z	Linux on System z	Linux on System z
Firewall (zGuard, StoneGate), any other OpenSource Software	WAS, HATS, HoD, MQSeries, WS Portal, etc.	DB2 UDB, DB2 Con, CTG, etc.

DB2 UDB

Connection via HiperSockets

z/VSE Production Environment

+ CICS
+ VTAM
+ TCP/IP
+ VSAM
+ COBOL
+ LE
+ ISV products

z/VSE Test Environment

+ CICS
+ VTAM
+ VSAM
+ COBOL

z/VM V5

z/VSE Production System LPAR (or VM guest)

z/VSE Test System LPAR (or VM guest)

IFL Engine

Standard Engine

IBM System z

z/VSE Strategy – easy as 'P I E'

Protect
existing investment

§ Existing core applications continue to run unchanged

§ Continuous follow-on development for HW and SW
  – from S/390 via zSeries to IBM System z9
  – from VSE/ESA to z/VSE

§ z/VSE is the platform of choice for transaction oriented core applications with CICS

§ Worldwide support from IBM Lab in Boeblingen
  – z/VSE dev and system ownership are located in Boeblingen
  – --> deep skills available
  – PoC – Proof of Concept (customer individual)
  – Briefings (customer individual)

Integrate
with IBM middleware using connectors

§ Integration of VSE into heterogeneous environments

§ z/VSE is a very stable operating system that can easily be connected to open systems
  – Access to external data (e.g. on Linux) or programs (e.g. Java) via standard connectors or via free of charge VSE specific connectors
  – Exploitation of HiperSockets within the server – no physical network outside the box

Extend
with Linux on System z

§ Extension of existing solutions with Linux on System z

§ Cooperation and coexistance with Linux on System z and z/VM

§ z/VSE is open and connectable to various different client/server platforms

TCP/IP V1.5 became generally available – J finally !

§ **GA of TCP/IP V1.5 from CSI since Oct 11, 2006**

- ►including documentation

§ **Significant enhancements to**

- ►Performance
- ►TCP/IP Stack
- ►FTP
- ►Security and SSL
- ►Message Logging
- ►Telnet
- ►eMail
- ►BSD/C Socket API

§ **Product also available from IBM since Nov 15, 2006**

VSE Changes since mid-2005

§ 06/11/2005 - VisualAge Generator EGL Plug-in for VSE

§ 06/21/2005 - WebSphere MQ client for VSE (no charge)

§ 07/27/2005 - announced IBM System z9-109 including SoD for z/VSE capacity measurement tool

§ 08/02/2005 - announced EoS for VSE/ESA V2.7 (effective 2/28/2007)

§ 10/06/2005 - CICS2WS tool (no charge) – supports VSE SOA web services

§ 11/01/2005 - z/VSE V3 FCP/SCSI qualification for DS6000 and DS8000

§ 11/25/2005 - z/VSE V3.1.1 (hardware support, BSM, VSE/POWER, etc.) available

§ 01/01/2006 - withdrawal of ESL charge option

§ 01/15/2006 - S/390 SUF discontinued (replaced by ShopzSeries)

§ 02/07/2006 - announced EoS for HLASM V1.4 (effective 4/7/2007)

§ 02/13/2006 - 31-bit I/O buffers in VSE/VTAM for z/VSE V3 available

§ 03/31/2006 - EoS for VSE/ESA V2.6 effective

§ 04/27/2006 - announced IBM System z9 EC/BC and previewed z/VSE V4 incl SoD for new SW pricing

§ 07/21/2006 - z/VSE V3.1.2 (service refresh and consolidation) available

§ 08/29/2006 - announced SoD for z/VSE V3+V4 support of TS1120 tape drive encrypting capability

§ 10/11/2006 - TCP/IP V1.5 generally available from CSI

More News from z/VSE ...

IBM Confidential contents removed !

§ **z/VSE Basics Book in review**

§ **z/VSE as part of IBM Academic Initiative started**

§ **z/VSE skills build-up in Eastern Europe started**

§ **z/VSE on tour w/ Novell/SUSE in Europe**

§ **z/VSE technical track at System z EXPO in Munich in 4/2007**

§ **z/VSE Hands-on Connector Workshop**

§ **First of a kind VM/VSE European Manager Conference under evaluation**

  ► **IT Managers and CIOs**

  ► **European wide audience**

  ► **Simultaneous translation into NLS**

  ► **Will take place in Spring 2007 (if enough customers are interested)**

IBM Systems

Agenda

§ **IBM System z9 EC/BC**

§ **z/VM and Linux on System z**

§ **z/VSE V4**

§ **New Software Pricing with z/VSE V4**

z/VSE V4 Statement of Direction

Statement of Direction announced as part of IBM System z9 announcement, July 2005:
"IBM intends to provide a software sub-capacity measurement tool for z/VSE."

§ **Fulfilled with z/VSE V4 Preview Announcement, April 2006:**

  ► LPAR based sub capacity monitoring tool

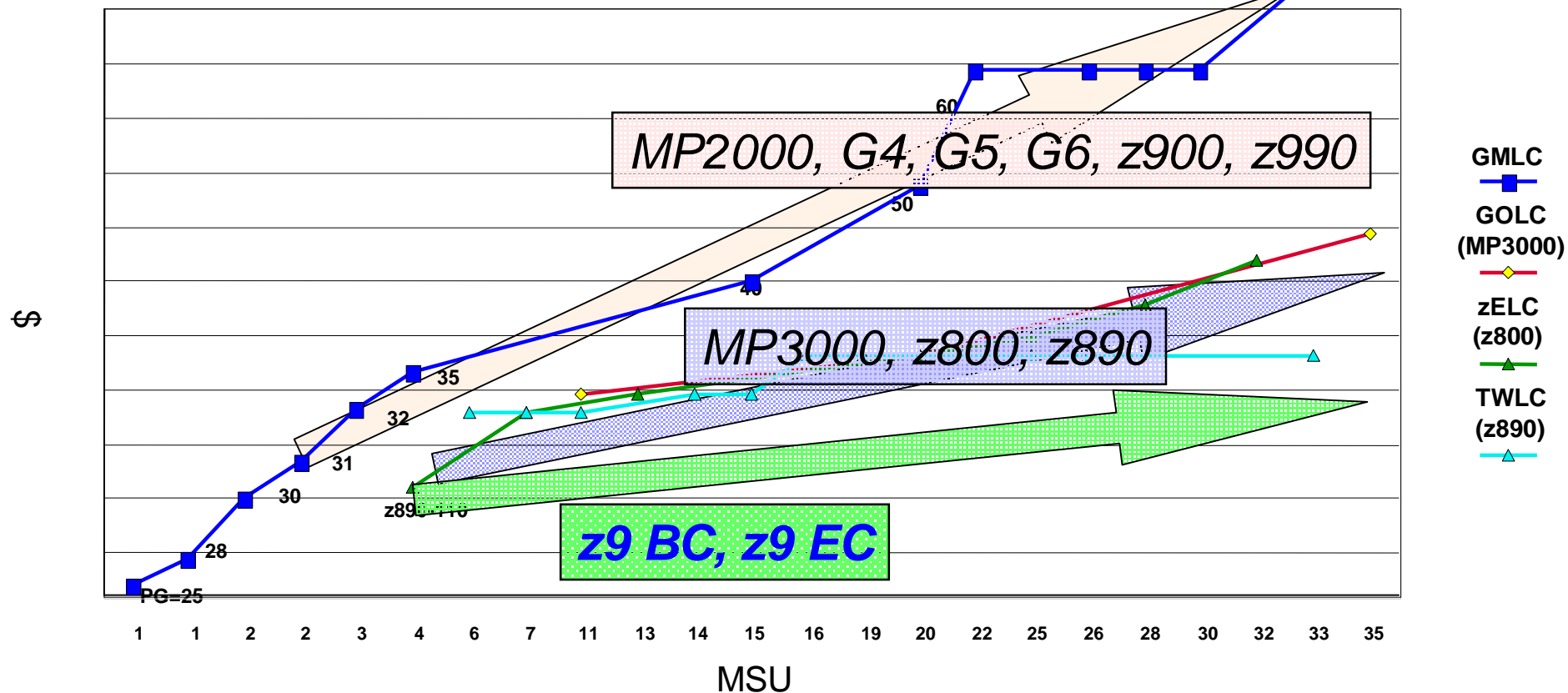§ **New Statement of Direction, announced with z/VSE V4 Preview Announcement:**

SOD: It is IBM's intent to provide new software pricing for z/VSE V4 when running on select processors, subject to applicable terms and conditions. IBM expects this new software pricing metric to provide more granularity and a subcapacity pricing option.

All statements regarding IBM's plans, directions, and intent are subject to change or withdrawal without notice.

SoD: New Software Pricing for z/VSE V4

Price for typical z/VSE "Stack"

MP2000, G4, G5, G6, z900, z990

MP3000, z800, z890

z9 BC, z9 EC

GMLC

**GOLC
(MP3000)**

**zELC
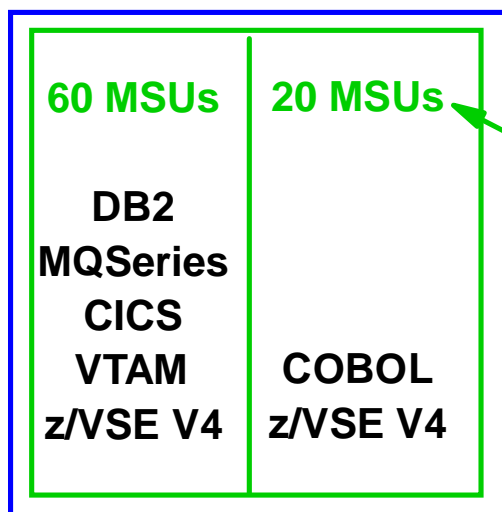(z800)**

**TWLC
(z890)**

$

MSU

Typical z/VSE stack consists of z/VSE Operating System, LE, CICS TS, VTAM, TCP/IP, DB2

All statements regarding IBM's plans, directions, and intent are subject to change or withdrawal without notice.

SoD: Sub Capacity Pricing Option for z/VSE V4

System z9 @ 100 MSUs

60 MSUs	20 MSUs
DB2 MQSeries CICS VTAM z/VSE V4	COBOL z/VSE V4

Full-Capacity Pricing Metrics:

Based on total rated capacity of the MACHINE where a product executes.

Ex: zELC, TWLC
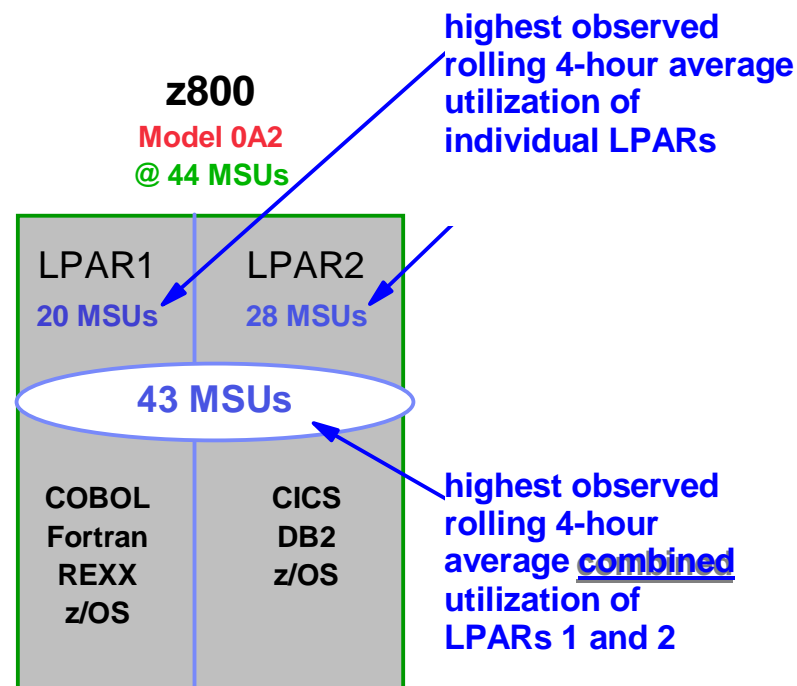
Sub-Capacity Pricing Metrics:

Based on actual monthly utilization of the LPAR(s) where a product executes.

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z/OS Sub Capacity Example using z800

Product	EWLC Sub-Cap	EWLC Full-Cap	zELC 0A2
COBOL 5648A25	$1129 20 MSUs	$2459 44 MSUs	$2286 zELC 0A2
Fortran 5668805	477 zELC 0A2	477 zELC 0A2	477 zELC 0A2
REXX 5695013	1335 zELC 0A2	1335 zELC 0A2	1335 zELC 0A2
CICS TS 5655147	7209 28 MSUs	12513 44 MSUs	11193 zELC 0A2
DB2 V7 5675DB2	6908 28 MSUs	11616 44 MSUs	11448 zELC 0A2
z/OS 5694A01	16735 43 MSUs	17060 44 MSUs	18935 zELC 0A2
Monthly TOTAL	$33,793	$45,460	$45,674

Prices in US$ as of March 2005

z800
Model 0A2
@ 44 MSUs

highest observed rolling 4-hour average utilization of individual LPARs

LPAR1
20 MSUs

LPAR2
28 MSUs

43 MSUs

COBOL Fortran REXX z/OS

CICS DB2 z/OS

highest observed rolling 4-hour average combined utilization of LPARs 1 and 2

Sub Capacity Concept: Rolling 4-Hour Average

Capture the 4-hour rolling average of utilization for each interval in the month
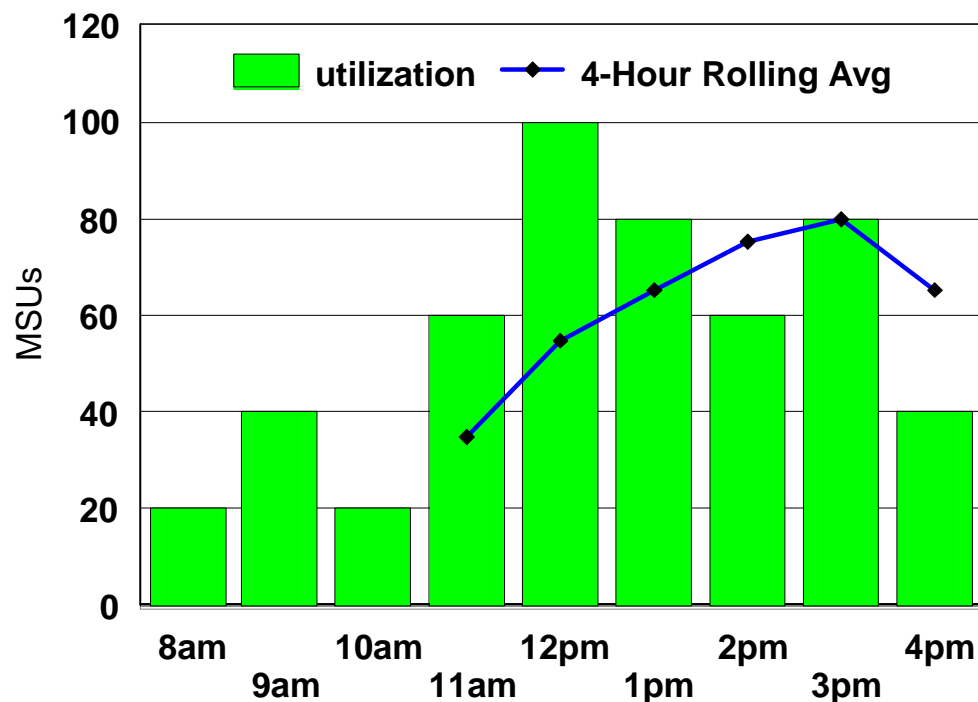
4-Hour Rolling Average

11 am (8,9,10,11):   35 MSUs

12 pm (9,10,11,12): 55 MSUs
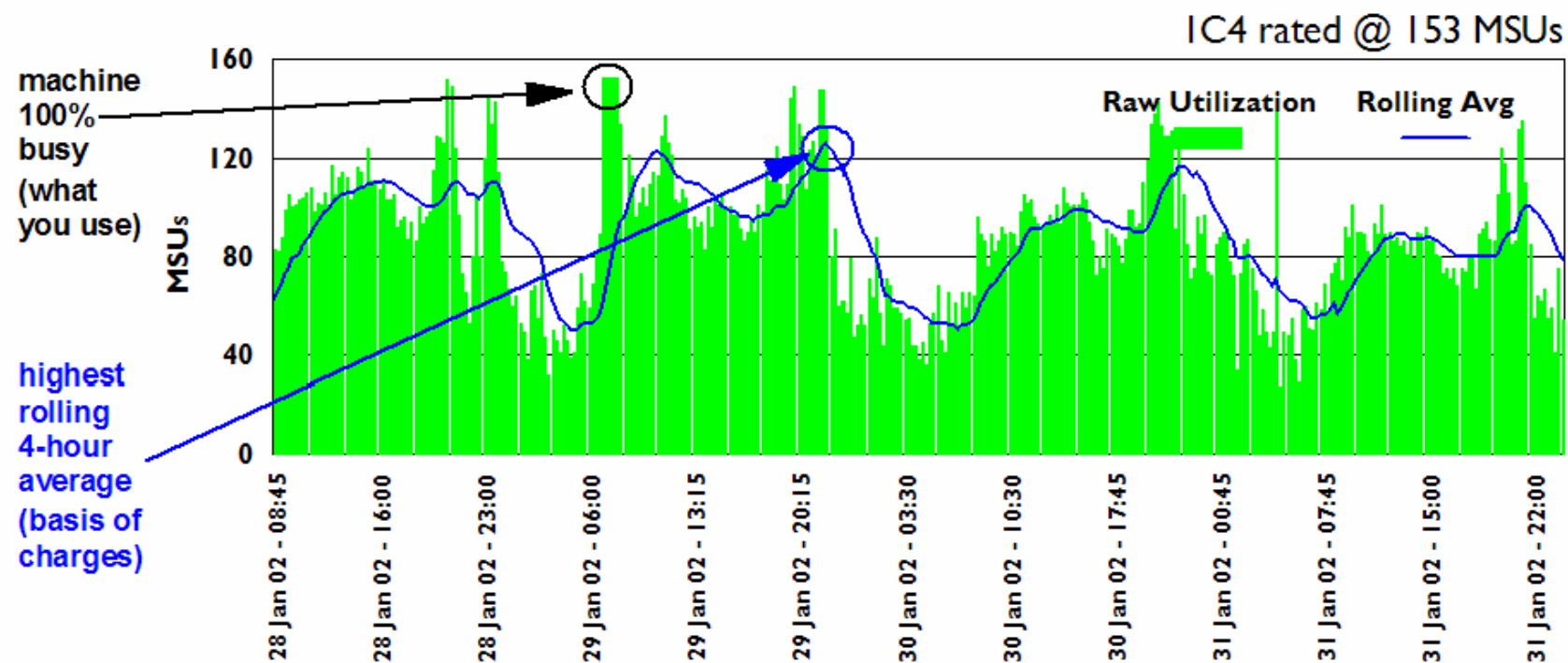
1 pm (10,11,12,1): 65 MSUs

2 pm (11,12,1,2):   75 MSUs

3 pm (12, 1, 2, 3): 80 MSUs

4 pm   (1, 2, 3, 4):   65 MSUs

Example: Rolling 4-Hour Average

Rolling 4-Hour Average utilization smoothes out peaks in raw utilization.
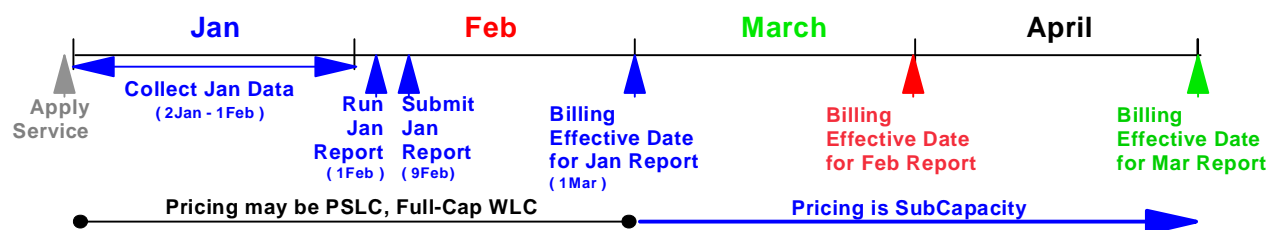Allows for varied peaks & bases Software charges on more moderate measure.

Sub Cap Pricing Option with z/VSE V4

§ **Basic Requirements**

► IBM System z9 BC or z9 EC

► z/VSE V4 (no older VSE version allowed on the processor, ie. no VSE/ESA V2, no z/VSE V3)

► If running under VM: z/VM 5.2 is required

► If running z/OS on the same processor: no OS/390 LPARs allowed

§ **Timing Requirements**

► Sub Cap Pricing begins with the submission of 1st full month report

► Data collection period: 2nd of the previous month - 1st of the current month

► Data submission period: 2nd - 9th following data collection

Jan	Feb	March	April

Apply Service

Collect Jan Data (2Jan - 1Feb)

Run Jan Report (1Feb)

Submit Jan Report (9Feb)

Billing Effective Date for Jan Report (1Mar)

Billing Effective Date for Feb Report

Billing Effective Date for Mar Report

Pricing may be PSLC, Full-Cap WLC

Pricing is SubCapacity

§ **Reporting Requirements**

► Must report on ALL LPARs (production, test, development, etc.)

► 95% data collection

§ **z/VSE Sub Capacity Customer Joint Study is currently running**

► If interested to sign up, touch base with the Lab via   **zvse@de.ibm.com**

All statements regarding IBM's plans, directions, and intent are subject to change or withdrawal without notice.

Summary: Exploiting the best of all Worlds on System z
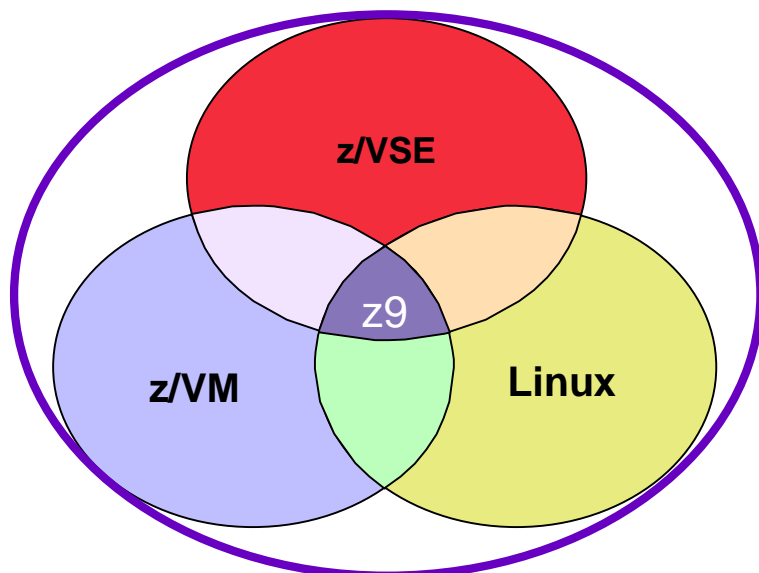
§ **z/VSE**

►Protect core IT investments

►Robust, secure enterprise server

►Cost-effective solutions

►Interoperability with network/servers

►z/OS affinity

§ **Linux on System z**

►Large portfolio of new applications

►Platform for IBM middleware

►Infrastructure simplification

►Massive scalability

§ **z/VM**

►Highly flexible, industrial strength

►Multiple VSE and Linux images

►Designed to exploit System z