Hints & Tips for sizing a system for z/VSE

Ingo Franzki – ifranzki@de.ibm.com

At a glance

§ **z/VSE is <u>not</u> z/OS**

– z/VSE does not scale as efficient as z/OS in terms of multiprocessing

§ **Consider additional overhead**

– When running under z/VM or in an LPAR

– When a version or release upgrade is planned

§ **Have a good understanding about the customers CPU utilization**

– A performance monitor is required (CA Explore, ASG TMON)

– Use CPUMON if not other monitor product is available

§ **Use LSPR z/VSE workloads Batch, Online and Mixed for capacity planning using the zPCR tool**

– Do not use MIPS tables !

§ **Contact me if you are unsure BEFORE the migration**

– ifranzki@de.ibm.com

Uni-processor vs. Multi-processor

§ **Sizing a system for z/VSE is different from sizing a system for z/OS**

- – Although z/VSE supports multiprocessing, z/VSE does not scale as efficient as z/OS does
  - Do not use more than 3 active processors per z/VSE LPAR or z/VM Guest

§ **In general, a faster single CPU is better than multiple smaller CPUs**

- – One partition (=data space in z/OS) can only exploit the power of one CPU
  - The largest partition (e.g. CICS) must fit into one single CPU
- – Dependent on nonparallel share (NPS) value

§ **Additional CPUs can be useful when multiple LPARs or z/VM Guests are used**

- – Define only up to 3 CPUs per LPAR or z/VM Guest, even if more than 3 CPUs are available on the CEC

Uni-processor vs. Multi-processor (2)

§ **If you have the choice between:**

- 1 CPU with 100 MIPS

- 2 CPUs with 50 MIPS each (~ 100 MIPS in total)

§ **... choose the uni-processor system !**

- Gives each VSE partition (e.g. CICS) the chance to get the full 100 MIPS

  • If no other job takes away CPU power

  • Dependent on the priorities and shares

§ **z/VM or LPAR hypervisor does a very good job in dispatching virtual CPUs to its guests**

- Set SHARE accordingly (e.g. give more the production system a higher share than development/test systems)

Consider additional CPU consumption

§ **z/VSE version or release upgrade**

– See next chart for overhead deltas

§ **z/VM version or release upgrade**

– z/VM V5 no longer supports V=R and V=F guests

– z/VM V5 no longer support I/O Assist

– Refer to Preferred Guest Migration Considerations at
http://www.vm.ibm.com/perf/tips/z890.html for assistance and background information

§ **Running z/VSE in an LPAR or under z/VM costs additional virtualization overhead**

§ **The z890, z990 and z9 BC and z9 EC (formerly z9-109) are LPAR-only machines**

– No basic mode any more

– Even if you run just one VSE system, it now runs in an LPAR (= 1 level or virtualization)

– Running z/VSE systems under z/VM means

• running z/VSE in z/VM in an LPAR (= 2 levels or virtualization)

Additional CPU consumption for VSE releases

VSE/ESA 2.3
Standard Dispatcher CICS/VSE
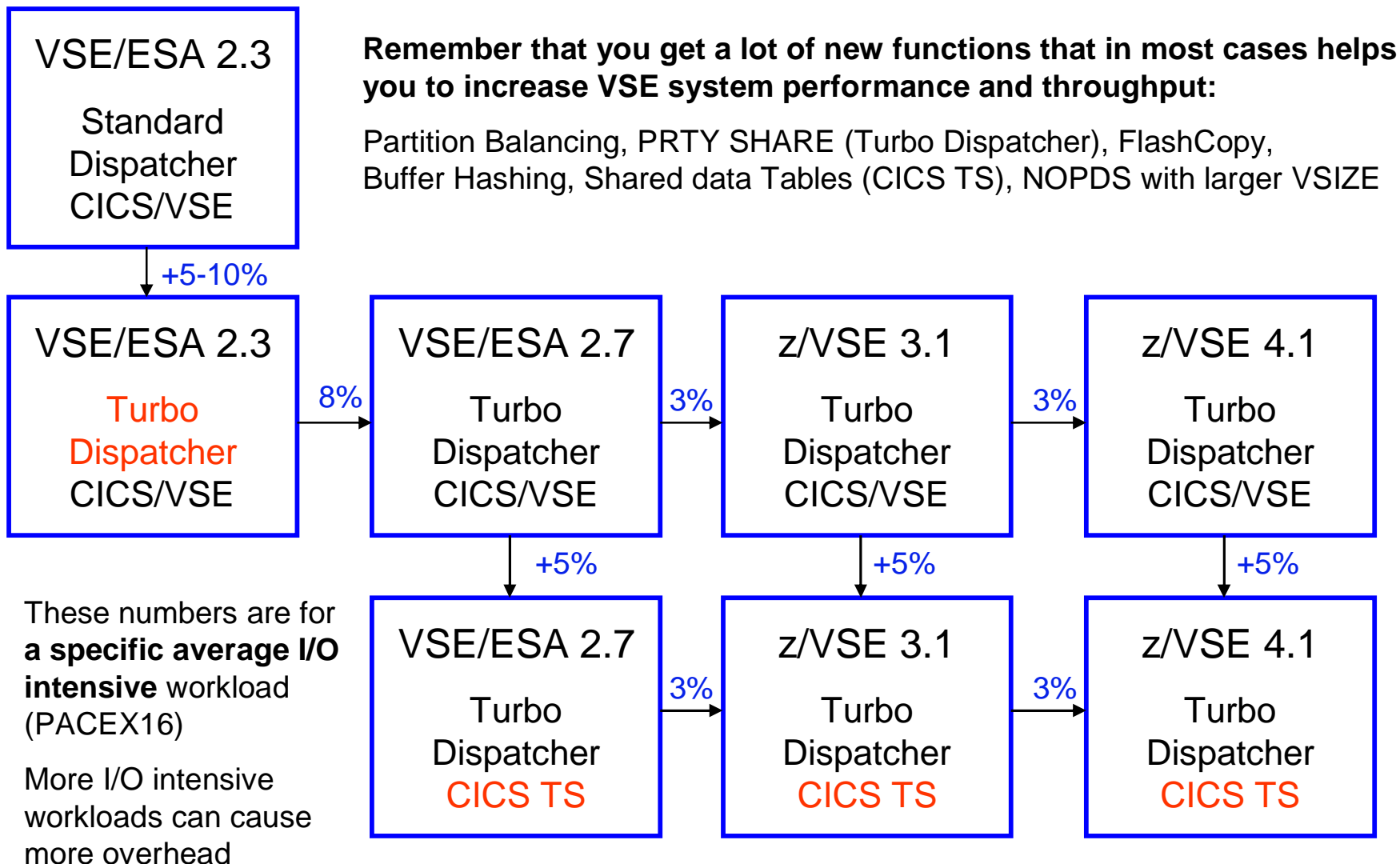
Remember that you get a lot of new functions that in most cases helps you to increase VSE system performance and throughput:

Partition Balancing, PRTY SHARE (Turbo Dispatcher), FlashCopy, Buffer Hashing, Shared data Tables (CICS TS), NOPDS with larger VSIZE

+5-10%

VSE/ESA 2.3		VSE/ESA 2.7		z/VSE 3.1		z/VSE 4.1
Turbo Dispatcher CICS/VSE	8% →	Turbo Dispatcher CICS/VSE	3% →	Turbo Dispatcher CICS/VSE	3% →	Turbo Dispatcher CICS/VSE

+5%   +5%   +5%

These numbers are for **a specific average I/O intensive** workload (PACEX16)

More I/O intensive workloads can cause more overhead

VSE/ESA 2.7		z/VSE 3.1		z/VSE 4.1
Turbo Dispatcher CICS TS	3% →	Turbo Dispatcher CICS TS	3% →	Turbo Dispatcher CICS TS

Understanding the customers CPU utilization

§ **To do proper capacity planning, a good understanding of the customers CPU utilization is required**

  – What is the CPU utilization over a day, week, month

  – Where are the peeks ?

§ **A performance monitor is required (CA Explore, ASG TMON) to get that information**

  – Use CPUMON if no other monitor product is available (see next foils)

  – Use z/VM Performance Toolkit (if running under z/VM)

§ **Have performance monitor data available for at least a typical month before you start the migration**

§ **Collect the same data when you run on the new system**

  – Keep the data (old and new) for several month after the migration

VSE CPU Monitor Tool

§ **Intended to help customers to measure the CPU utilization of their VSE system over a period of time.**

§ **When you plan for a processor upgrade it is very important to know the CPU utilization of your VSE system over a day or a week.**

– Helps you to estimate the size of the new processor.

§ **The VSE CPU Monitor Tool is not intended to replace any existing monitoring product provided by partners.**

§ **It provides only very basic monitoring capabilities on an overall VSE system level.**

§ **No details about CPU usage of certain applications are provided**

§ **Download**

– http://www.ibm.com/servers/eserver/zseries/zvse/downloads/tools.html

– 'As is', no official support, e-mail to zvse@de.ibm.com

VSE CPU Monitor Tool (2)

§ **CPUMON periodically issues a TDSERV FUNC=TDINFO macro to get performance relevant data.**

§ **The data provided by the macro is the same as command QUERY TD shows.**

§ **The data from each measurement interval is printed to SYSLST in a comma separated format.**

§ **Later on this data can be imported into a spreadsheet (EXCEL)**

§ **CPUMON runs in a VSE partition (dynamic or static).**

§ **CPUMON is started using:**

```
// EXEC DTRIATTN,PARM='SYSDEF TD,RESETCNT'
/*
// EXEC CPUMON,PARM='nn'  nn = interval in seconds
/*
```

§ **The tool can be stopped by entering the following command:**

```
MSG xx,DATA=EXIT          xx = partition id
```

VSE CPU Monitor Tool (3)

Example CPU utilization chart

July 21, 2008
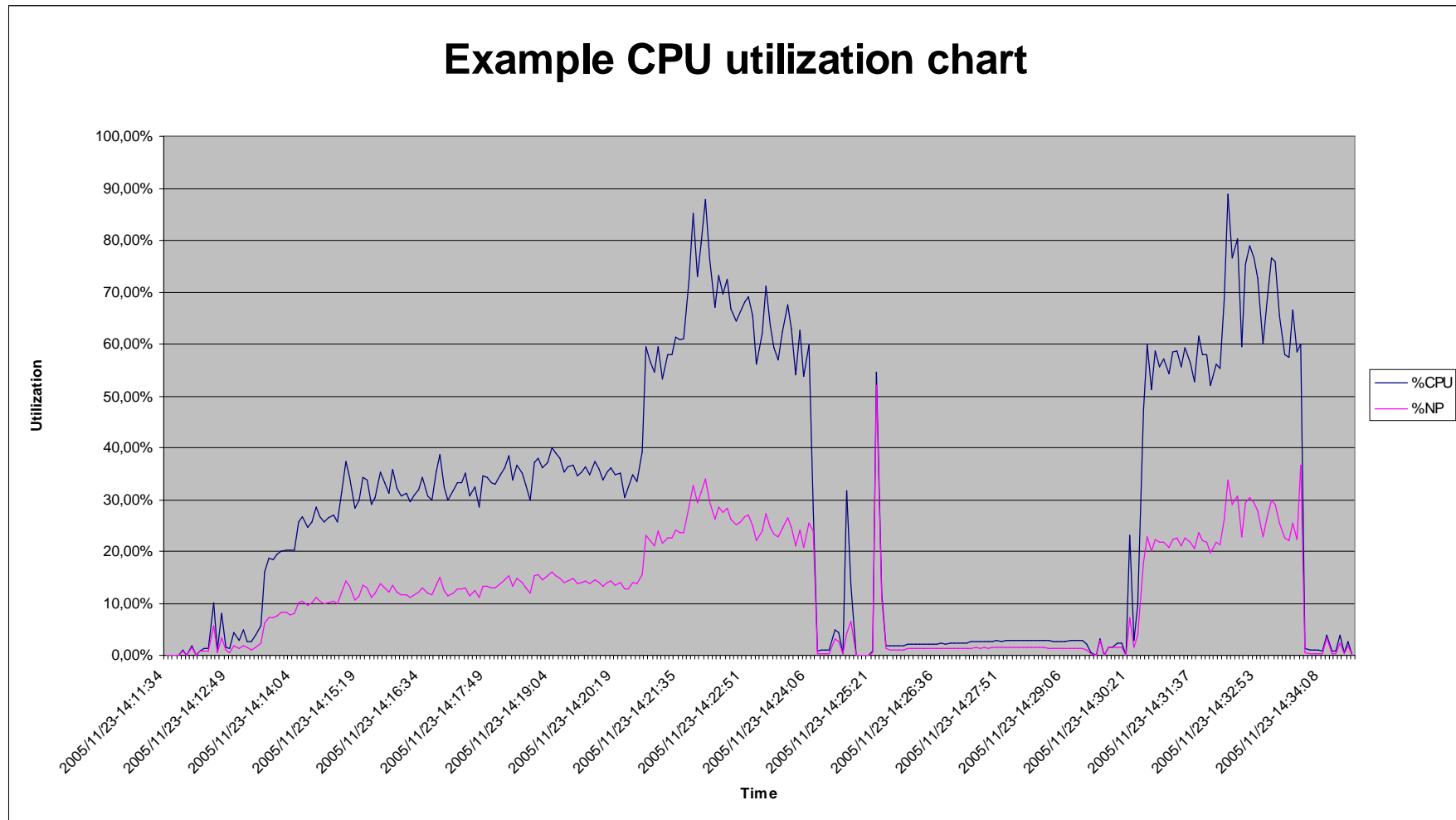
Sizing a new system using zPCR (or CP3000)

§ **zPCR Tool uses LSPR numbers to make different systems comparable**

   – No VSE specific LSPR numbers available for newer processors

§ **Use z/VSE workloads Batch (similar to z/OS LoIO-Mix), Online (similar to z/OS TM-Mix) or Mixed**

§ **z/VSE CICS workload typically runs faster than batch**

   – CB-L gives a worst case comparison

§ **MIPS tables should only be used for a very rough guess**

   – not for serious capacity planning

§ **Always look at the uni-processor capacity**

   – This is what VSE jobs / partitions will get at maximum

IBM Processor Capacity Reference for zSeries (zPCR)

§ **The zPCR tool was released for customer use on October 25, 2005**

  – **http://www.ibm.com/support/techdocs/atsmastr.nsf/WebIndex/PRS1381**

  – **'As is', no official support, e-mail to zpcr@us.ibm.com**
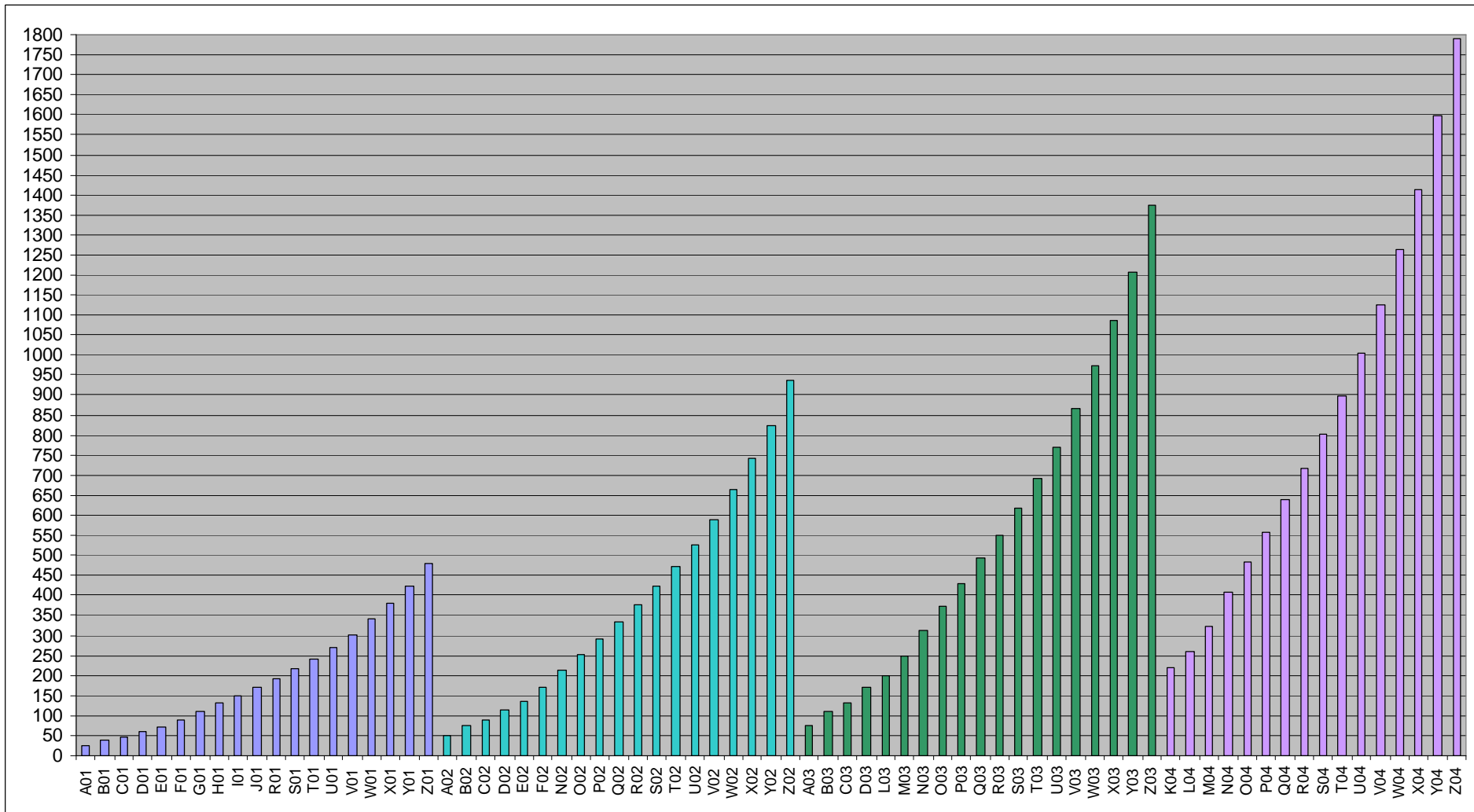
§ **PC-based productivity tool under Windows**

§ **It is designed to provide capacity planning insight for IBM System z9 and eServer zSeries processors running various workload environments**

§ **Capacity results are based on IBM's LSPR data supporting all IBM System z9 and eServer zSeries processors**

  – Large System Performance Reference:
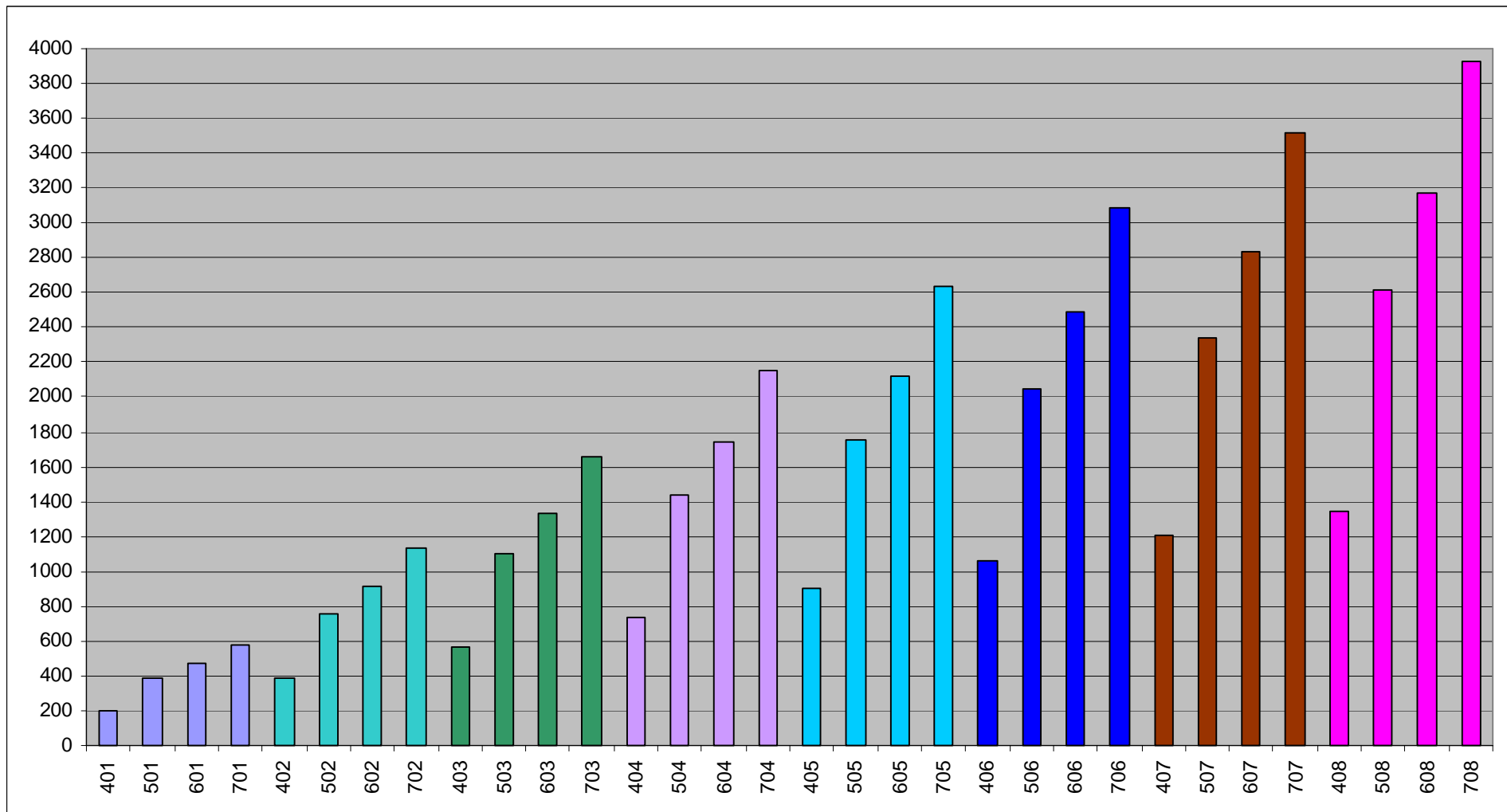   http://www.ibm.com/servers/eserver/zseries/lspr/

§ **For VSE use z/VSE workloads Batch, Online or Mixed**

IBM System z9 BC (1-4 CPUs)

Note: Do not use MIPS to do any kind of capacity planning, use the zPCR tool instead !

Ingo Franzki ifranzki@de.ibm.com   July 21, 2008   © 2007 IBM Corporation
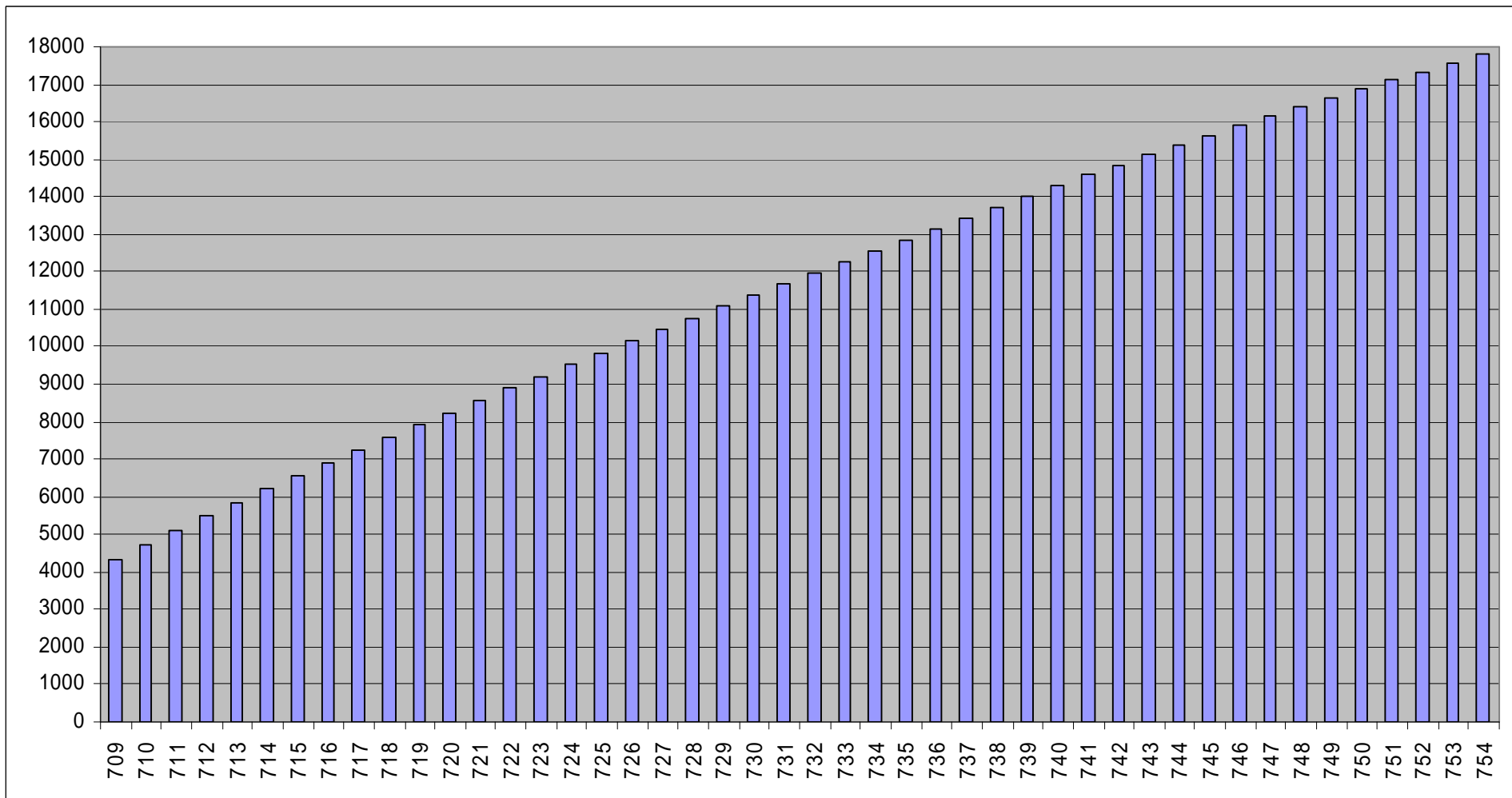
IBM System z9 EC subcapacity models (1-8 CPUs)

Note: Do not use MIPS to do any kind of capacity planning, use the zPCR tool instead !

IBM System z9 EC (9-54 CPUs)

Note: Do not use MIPS to do any kind of capacity planning, use the zPCR tool instead !

Running z/VSE V4 under z/VM

§ **z/VM V5.2 (or later) is a prerequisite for running z/VSE V4.1 under z/VM**

  – If you IPL z/VSE V4.1 in a guest system of z/VM version 4 or z/VM 5.1, you may experience severe performance problems

  – Because of that the following message is issued during IPL:

    • `0J86I WARNING: VM RELEASE NOT SUPPORTED BY VSE 4.1`
      `– Z/VM 5.2 OR LATER REQUIRED`

  – If you receive this message, you must urgently upgrade your VM system to z/VM 5.2 or a later release.

§ **Note: It is not required to run z/VSE under z/VM, you can also run z/VSE in an LPAR**

Ingo Franzki ifranzki@de.ibm.com
July 21, 2008

Midrange Workload License Charge (MWLC)

§ **MWLC is a new monthly license charge price metric on the IBM System z9 servers**

- Full-capacity: based on the IBM rated capacity of the z9 Server
- Sub-capacity: based on the utilization of the LPARS or z/VM guests

§ **It applies to z/VSE V4 and 12 key VSE-related middleware programs**

- such as CICS TS for VSE, ACF/VTAM for VSE, and DB2 Server for VSE.

§ **MWLC is only available on z9 EC and z9 BC servers with z/VSE V4.**

§ **It is NOT a performance topic**

- Just for pricing

§ **Capacity Measurement Tool**

- Measures used MSUs (Millions of Service Units) per image (z/VM guest or LPAR)
  - Measurement interval = 30 minutes
  - Calculates 4 hour rolling average
- Not to be used for performance tuning !

§ **For more details see**

- **IBM System z9 and eServer zSeries Software Pricing:**
  http://www.ibm.com/servers/eserver/zseries/swprice/
- **IBM's MSU ratings for the z9 Servers:**
  http://www.ibm.com/servers/eserver/zseries/library/swpriceinfo/hardware.html

Considerations for z/VSE version or release upgrades

§ **Additional overhead for release or version upgrade**

– Make sure your processor sizing is still sufficient

§ **Install the hardware PSP buckets BEFORE you go to a new server**

§ **Also check for upgrades of Vendor software**

– Back level vendor software sometimes cause problems or do not work at all on newer VSE versions

§ **Order the latest refresh level just before you start the upgrade/installation**

§ **Apply PSP buckets and/or RSLs before you go to production**

Ingo Franzki ifranzki@de.ibm.com   July 21, 2008

Still unsure if the sizing is sufficient ?

§ **Please contact me BEFORE you migrate to the new system**

– I will <u>review</u> a sizing done by a BP or customer if there are doubts

– But: It is the BP's job to do the sizing

§ **VSE Performance documentation:**
http://www.ibm.com/servers/eserver/zseries/zvse/documentation/performance.html

Ingo Franzki ifranzki@de.ibm.com   July 21, 2008   © 2007 IBM Corporation