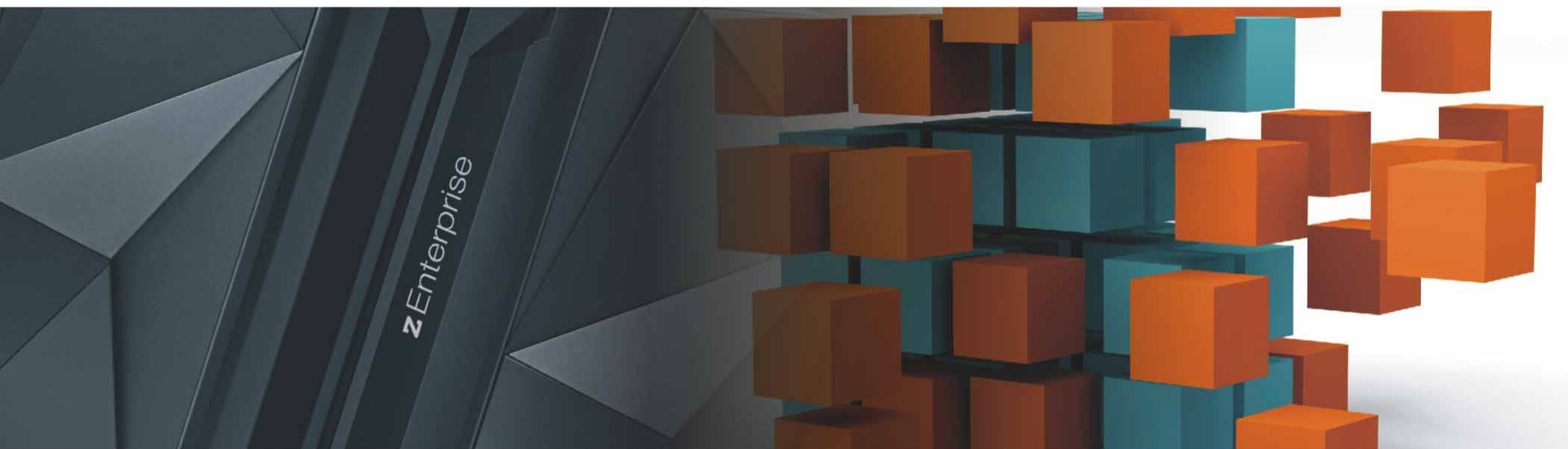


z/VSE CMT and SCRT Update

Jens Remus



<http://www.ibm.com/zVSE>
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Agenda



- 4 Hour Rolling Average (4HRA)
- Sub-Capacity Measurement and Reporting on z/VSE
 - Capacity Measurement Tool (CMT)
 - Sub-Capacity Reporting Tool (SCRT)
 - Sub-Capacity Report
- Enhancements to CMT and SCRT
- Hints & Tips
- Programming APIs
 - Capacity Measurement Tool (CMT) API
 - Query Virtual Server (QVS) API

Sub-Capacity Software Pricing Four Hour Rolling Average (4HRA)

- Work is measured in Service Units (SU)
- Capacity and utilization is measured in Millions of Service Units (MSU) per hour

4-Hour Rolling Average

11 am (8,9,10,11): 35 MSU s

12 pm (9,10,11,12): 55 MSU s

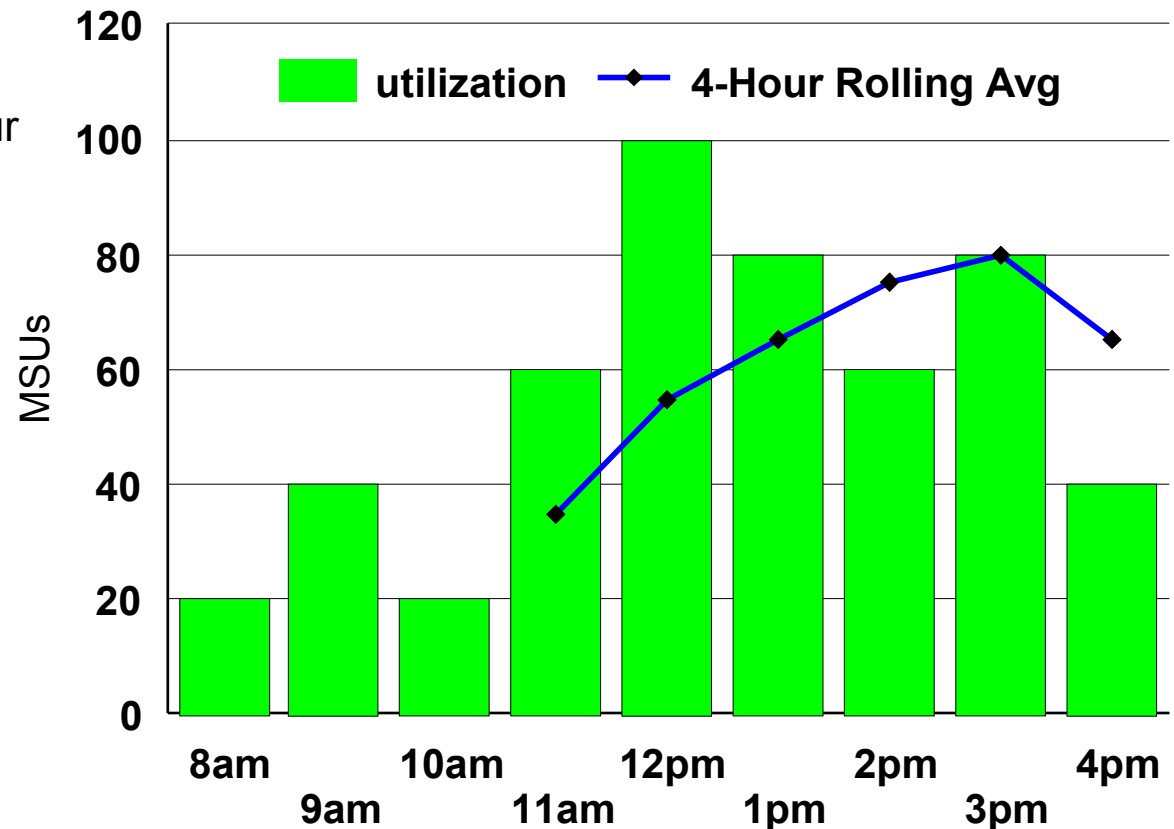
1 pm (10,11,12,1): 65 MSU s

2 pm (11,12,1,2): 75 MSU s

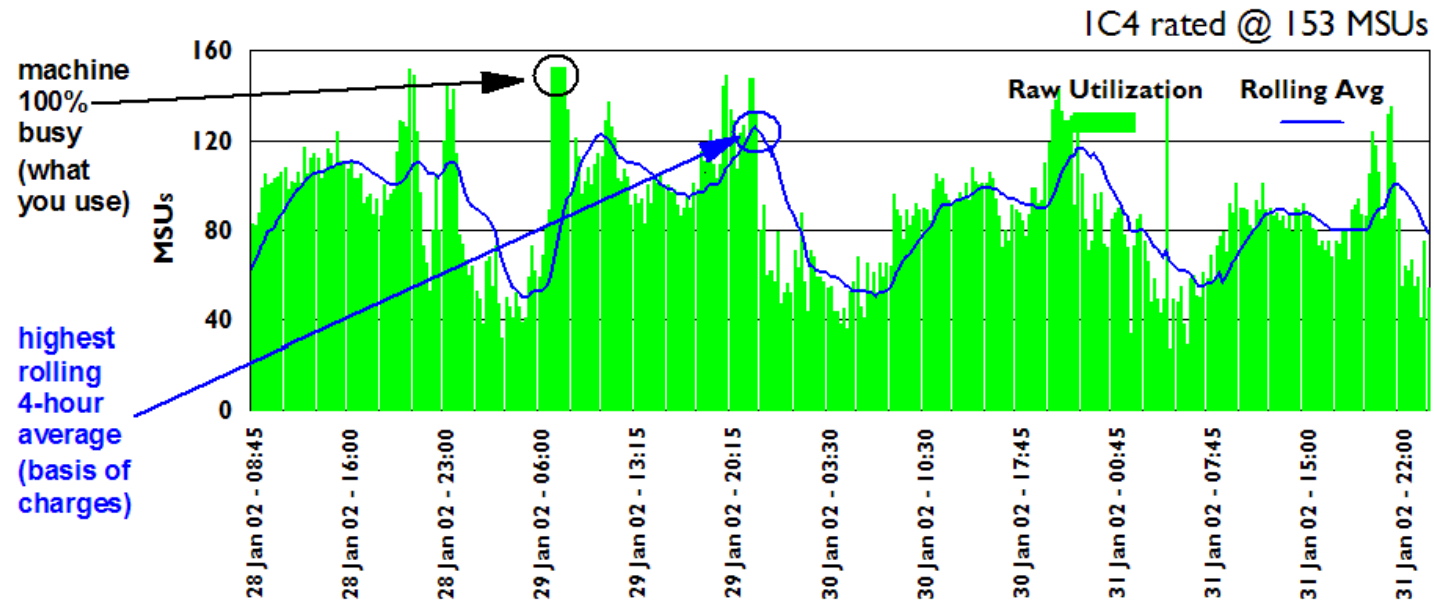
3 pm (12, 1, 2, 3): 80 MSU s

4 pm (1, 2, 3, 4): 65 MSU s

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



Sub-Capacity Software Pricing Four Hour Rolling Average (4HRA) (cont.)



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



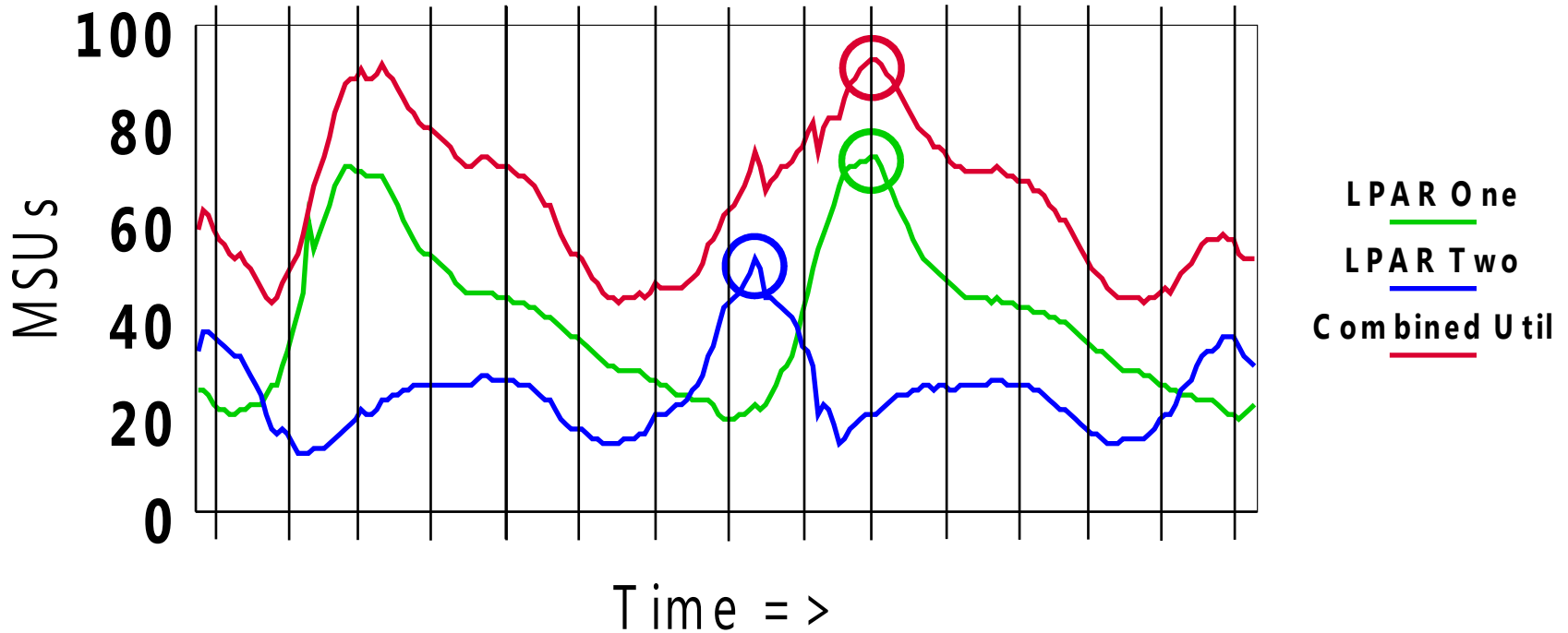
Sub-Capacity Software Pricing Four Hour Rolling Average (4HRA) (cont.)

Peak LPAR1 = 73

Peak LPAR2 = 52

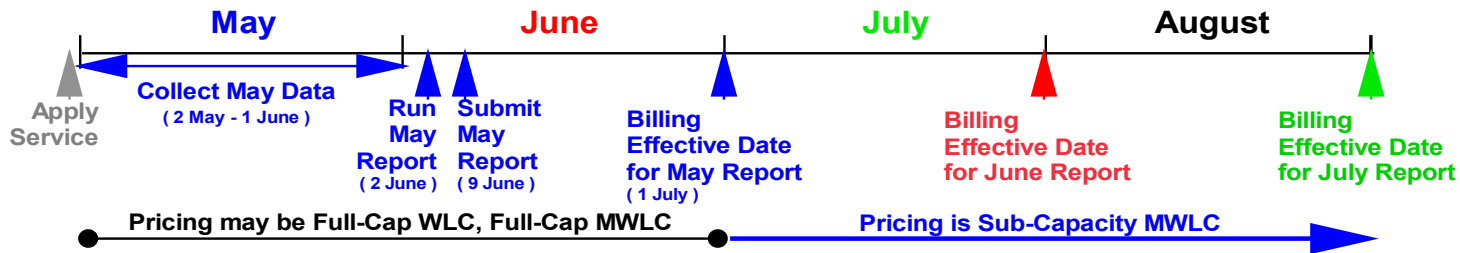
Combined Peak = 93

(NOT PeakLPAR1 + PeakLPAR2 = 125)



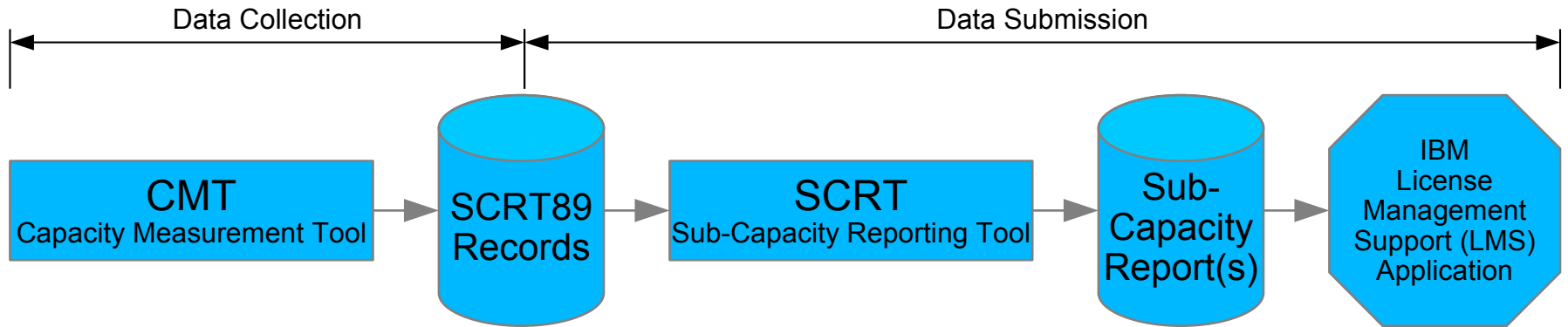
Sub-Capacity Software Pricing for z/VSE

- Minimum HW & SW Requirements:
 - System z9 (z9 and z10: not model A01)
 - z/VSE 4.1
 - z/VM 5.2 if running under z/VM
- Process
 - Data collection period: 2nd of a month to 1st of the following month
 - Data submission period: 2nd to 9th of a month following data collection



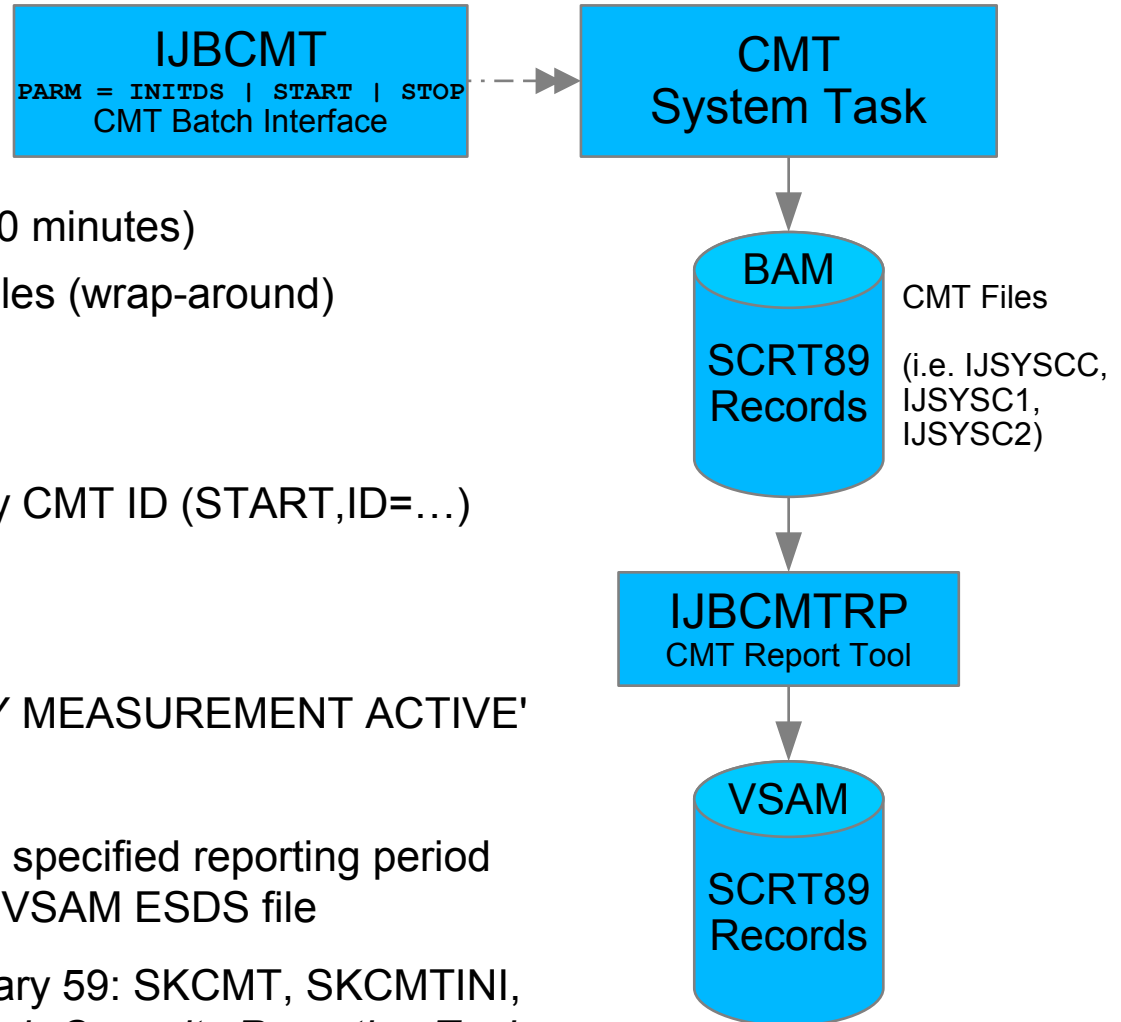
- Reporting Requirements
 - Must report on all LPARs and z/VM guests (e.g. production, test, development, ...)
 - 95% overall data collection
 - Default (i.e. worst case) are full-capacity prices

Sub-Capacity Measurement and Reporting on z/VSE

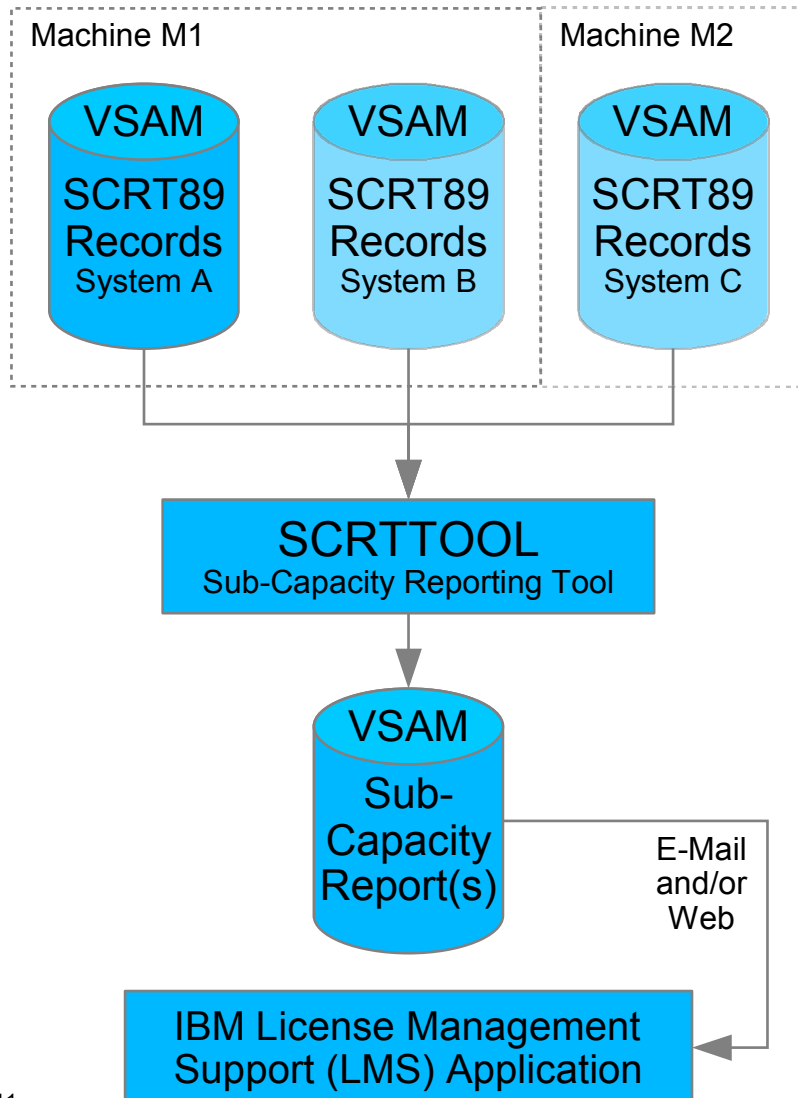


z/VSE Capacity Measurement Tool (CMT) Overview

- CMT System Task
 - Measures used CPU capacity
 - Generates a SCRT89 record every measurement interval (30 minutes)
 - Writes the record to the CMT files (wrap-around)
- CMT Batch Interface (IJBCEMT)
 - Initialize CMT files (INITDS)
 - Start measurement and specify CMT ID (START, ID=...)
 - Stop measurement (STOP)
- SIR AR Command
 - Query CMT status: 'CAPACITY MEASUREMENT ACTIVE'
- CMT Report Tool (IJBCEMTRP)
 - Extracts SCRT89 records for a specified reporting period from the CMT BAM files into a VSAM ESDS file
- Setup using skeletons in ICCF library 59: SKCMT, SKCMTINI, SKCMTREP (Manual: *Using the Sub-Capacity Reporting Tool* (“SCRT User's Guide”), SG24-6522)



Sub-Capacity Reporting Tool (SCRT) Overview



- Sub-Capacity Reporting Tool (SCRT)
 - Processes SCRT89 records from multiple systems (and optional from multiple machines) together
 - Generates a Sub-Capacity Report (“SCRT report”) for each machine
- The SCRT report is in Comma Separated Values (CSV) format; can be viewed and edited using spreadsheet applications (e.g. MS Excel, OO.org Calc)
- Submission process to IBM License Management Support (LMS) application:
 - Download report to workstation for review and editing, then use either e-mail or web for submission to LMS
 - Send by e-mail to LMS, then manage, edit, and confirm via web



Sub-Capacity Reporting Tool (SCRT) Types of Products

- **SCRT89-Products:** Monitored by CMT. SCRT89 record contains information if product was active during the measurement interval.
 - VSE Central Functions V8 and V9 (z/VSE V4 and V5; 5686-CF8 and 5686-CF9)
 - CICS TS for VSE/ESA (5648-054)
 - ACF/VTAM V4 VSE/ESA (5686-065)

- **NO89-Products:** Not monitored by CMT. Customer provides list of LPARs and VM guests where the products were active in SCRT JCL NO89 section.
 - DB2 Server for VSE & VM (5697-F42)
 - DITTO/ESA for VSE (5648-099)
 - DL/1 DOS/VS (5746-XX1)
 - High Level Assembler VSE & VM (5696-234)
 - IBM C for VSE/ESA V1 (5686-A01)
 - IBM COBOL VSE/ESA (5686-068)
 - IBM DFSORT/VSE V3 (5746-SM3)
 - IBM PL/1 for VSE/ESA (5686-069)
 - MQSeries for VSE/ESA V2 (5686-A06)
 - WebSphere MQ for VSE/ESA V3 (5655-U97)
 - TCP/IP for VSE (5686-A04)
 - IBM Rational COBOL Runtime for Z/VSE V7 (5648-F66)
 - IPv6/VSE V1 (5686-BS1)



Sub-Capacity Reporting Tool (SCRT)

JCL Sections

Label Definitions

- Input files containing SCRT89 records
- Output file for the SCRT report

INPUT-Section

- List of DLBLs of input files

PARMS-Section

- Customer information
- Report period (optional)
- Comments (optional)

SPECIAL-Section (optional)

- For use in special situations

NO89-Section

- List of LPARs and VM Guests where NO89 products were active

```

* DLBLS OF ALL INPUT FILES CONTAINING SCRT89 RECORDS
// DLBL INPUT1,'SCRT89.RECORDS.VSE1',,VSAM,CAT=DATACAT
// DLBL INPUT2,'SCRT89.RECORDS.VSE2',,VSAM,CAT=DATACAT

* DLBL OF OUTPUT FILE TO SAVE THE SCRT REPORT TO
// DLBL OUTPUT,'SCRT.REPORT',,VSAM,CAT=DATACAT

// EXEC SCRTTOOL

$INPUT:
* ENTER DLBLS OF ALL INPUT FILES CONTAINING SCRT89 RECORDS
INPUT1
INPUT2

$PARMS:
Customer_Name=John Doe Corporation
Customer_Number=123456789
Contact_Name=John Doe
Contact_Email=john.doe@corporation.dom
Contact_Phone=+1-123-456-7890
* PO_Number=
* Report_Period=YYYY/MM
* Report_Period=Last_Month
* LPAR_Comment CPC= ,LPAR= ,
* Comment="....."

*$SPECIAL:
* Exclude CPC= ,Image_Id= ,Product_Id= ,
* Start= ,Resume=

$NO89:
* DB2 SERVER FOR VSE & VM
5697-F42=*NONE
* DITTO/ESA FOR VSE
5648-099=*ALL
[...]
```

Sub-Capacity Report Overview

- File Format: Comma Separated Values (CSV)
 - Plain text; tabular data; columns separated by comma; each line represents one row; strings are enclosed within double quotes
 - Common spreadsheet applications (e.g. MS Excel, OO.org Calc) can read and write CSV
- Report Sections:
 - SCRT Sub-Capacity Report (B5)
 - Tool Information (C5)
 - Product Summary Information (E5)
 - Detail Data Collection (H5)
 - Detail Data Sections – For Customer Analysis Purposes Only (L5)
 - SMF / SCRT89 Input Data Statistics (M5)
 - Detail LPAR Data Section (N5)
 - Product Max Contributors (P5)
 - Product Grid Snapshot (Q5)
 - Disclaimer and Hash (W5)



Sample Sub-Capacity Report

SCRT Sub-Capacity Report (B5) Section

```

"==B5===== SCRT SUB-CAPACITY REPORT - IBM Corp ====="
""
"Run Date/Time","07 Aug 2012 - 13:39"
"Name of Person Submitting Report:","John Doe"
"E-Mail Address of Report Submitter:","john.doe@corporation.dom"
"Phone Number of Report Submitter:","+1-123-456-7890"
""
"Customer Name","John Doe Corporation"
"Customer Number","1234567890"
"Machine Serial Number","12-34567"
"Machine Type and Model","2827-608"
"Machine Rated Capacity (MSUs)","783"
"Purchase Order Number","(optional)"
"Customer Comments (255 chars max)","(optional)"
""
"For recurring charge (MLC) products, the data supplied in this report will be used to adjust"
"the billable MSUs in inventory for all MLC Products listed under the MLC Product Name"
"column on this report. In accordance with our agreement, IBM will treat a change in product"
"licensed capacity as an order. If the MSUs have changed since the last report, software billing"
"based on inventory MSUs will increase or decrease accordingly."
""
"Note: This report is expected to provide a ""% data collected"" > 95% and data reporting"
"period beginning on the 2nd of the previous month and ending on the 1st of the current month."
""

```



Sample Sub-Capacity Report Tool Information (C5) Section

====C5=====

TOOL INFORMATION

Tool Release	20.2.10	
Reporting Period	2 Jun, 2012 - 1 Jul, 2012 inclusive (30 days)	
% Data Collected for z/VSE	51%	Justification for low data collection (255 chars max) (required)



Sample Sub-Capacity Report

Product Summary Information (E5) Section

=====E5=====

PRODUCT SUMMARY INFORMATION

MLC Product Name	MLC Product ID	Tool MSUs	Customer MSUs	Customer Comments (255 chars max)
z/VSE	(All)		206	
VSE Central Functions V9	5686-CF9		103	
VSE Central Functions V8	5686-CF8		103	
ACF/VTAM V4 VSE/ESA	5686-065		206	
CICS TS for VSE/ESA	5648-054		206	
DITTO/ESA for VSE	5648-099		206 (optional)	(conditional)
High Level Assembler VSE & VM	5696-234		206 (optional)	(conditional)
IBM C for VSE/ESA V1	5686-A01		206 (optional)	(conditional)
TCP/IP for VSE	5686-A04		206 (optional)	(conditional)



Sample Sub-Capacity Report Detail Data Collection (H5) Section

=====H5=====

DETAIL DATA COLLECTION

	SYSID	Input Data Start	Input Data End	Report Period % Data	Customer Comments (255 chars max)
R35LP11	V510	02 Jun 2012 - 00:00	13 Jun 2012 - 11:30	38.3%	
R35LP45(R3545057)	V430	22 Jun 2012 - 13:59	26 Jun 2012 - 12:00	13.1%	
R35LP45(R3545058)	V511	22 Jun 2012 - 14:01	26 Jun 2012 - 12:00	13.0%	
IRD7	-	-	-	0.0%	(required)
R35LP14	-	-	-	0.0%	(required)
IRD6	-	-	-	0.0%	(required)
IRD8	-	-	-	0.0%	(required)
R35LP28	-	-	-	0.0%	(required)
TRX2	-	-	-	0.0%	(required)
R35LP43	-	-	-	0.0%	(required)
R35LP44	-	-	-	0.0%	(required)
TRX1	-	-	-	0.0%	(required)
TRX2CFA	-	-	-	0.0%	(required)
R35LP56	-	-	-	0.0%	(required)
CPC		02 Jun 2012 - 00:00	26 Jun 2012 - 12:00	51.5%	



Sample Sub-Capacity Report

SMF / SCRT89 Input Data Statistics (M5) Section

=====M5=====

SMF / SCRT89 INPUT DATA STATISTICS

	SYSID	Input Data Start	Input Data End
R35LP11	V510	01 Jun 2012 - 09:55	13 Jun 2012 - 11:30
R35LP45(R3545057)	V430	22 Jun 2012 - 13:59	26 Jun 2012 - 12:00
R35LP45(R3545058)	V511	22 Jun 2012 - 14:01	26 Jun 2012 - 12:00
IRD7	-	-	-
R35LP14	-	-	-
IRD6	-	-	-
IRD8	-	-	-
R35LP28	-	-	-
R35LP41	-	-	-
R35LP43	-	-	-
R35LP44	-	-	-
TRX1	-	-	-
TRX2CFA	-	-	-
R35LP56	-	-	-
TRX2	-	-	-
CPC		01 Jun 2012 - 09:55	26 Jun 2012 - 12:00



Sample Sub-Capacity Report

Detail LPAR Data Section (N5) Section

====N5=====

DETAIL LPAR DATA SECTION

	Highest	Hour Count	Date/Time	2nd Highest	Hour Count	Date/Time
R35LP11	103	17	12 Jun 2012 - 19:00	102	1	12 Jun 2012 - 18:00
R35LP45(R3545057)	103	42	23 Jun 2012 - 04:00	102	2	26 Jun 2012 - 10:00
R35LP45(R3545058)	103	42	23 Jun 2012 - 04:00	102	2	26 Jun 2012 - 10:00
CPC	206	42	23 Jun 2012 - 04:00	204	2	26 Jun 2012 - 10:00

====N5=====

"DETAIL LPAR DATA SECTION"

""

","Highest","Hour Count","Date/Time","","2nd Highest","Hour Count","Date/Time"

""

"R35LP11",103,17,"12 Jun 2012 - 19:00","",102,1,"12 Jun 2012 - 18:00"

"R35LP45 (R3545057) ",103,42,"23 Jun 2012 - 04:00","",102,2,"26 Jun 2012 - 10:00"

"R35LP45 (R3545058) ",103,42,"23 Jun 2012 - 04:00","",102,2,"26 Jun 2012 - 10:00"

""

"CPC",206,42,"23 Jun 2012 - 04:00","",204,2,"26 Jun 2012 - 10:00"

""



Sample Sub-Capacity Report Product Max Contributors (P5) Section

==P5=====

PRODUCT MAX CONTRIBUTORS

Product Name	Product ID	Highest	Date/Time	LPAR	LPAR	LPAR
				R35LP11	R35LP45 (R3545057)	R35LP45 (R3545058)
z/VSE	(All)	206	23 Jun 2012 - 04:00	0	103	103
VSE Central Functions V9	5686-CF9	103	12 Jun 2012 - 19:00	103	0	0
VSE Central Functions V8	5686-CF8	103	23 Jun 2012 - 04:00	0	103	0
ACF/VTAM V4 VSE/ESA	5686-065	206	23 Jun 2012 - 04:00	0	103	103
CICS TS for VSE/ESA	5648-054	206	23 Jun 2012 - 04:00	0	103	103
DITTO/ESA for VSE	5648-099	206	23 Jun 2012 - 04:00	0	103	103
High Level Assembler VSE & VM	5696-234	206	23 Jun 2012 - 04:00	0	103	103
IBM C for VSE/ESA V1	5686-A01	206	23 Jun 2012 - 04:00	0	103	103
TCP/IP for VSE	5686-A04	206	23 Jun 2012 - 04:00	0	103	103



Sample Sub-Capacity Report Product Grid Snapshot (Q5) Section

=====Q5=====

PRODUCT GRID SNAPSHOT

Product Name	Product ID	R35LP11	R35LP45 (R3545057)	R35LP45 (R3545058)
z/VSE	(All)	38.3%	13.1%	13.0%
VSE Central Functions V9	5686-CF9	38.3%		13.0%
VSE Central Functions V8	5686-CF8		13.1%	
ACF/VTAM V4 VSE/ESA	5686-065	38.3%	13.1%	13.0%
CICS TS for VSE/ESA	5648-054	38.3%	13.1%	13.0%

=====Q5=====

"PRODUCT GRID SNAPSHOT"

""

"Product Name","Product ID","","","","R35LP11","R35LP45 (R3545057) ","R35LP45 (R3545058) "

""

"z/VSE","(All)","","","","38.3%","13.1%","13.0%"

"VSE Central Functions V9","5686-CF9","","","","38.3%","","13.0%"

"VSE Central Functions V8","5686-CF8","","","","13.1%",""

"ACF/VTAM V4 VSE/ESA","5686-065","","","","38.3%","13.1%","13.0%"

"CICS TS for VSE/ESA","5648-054","","","","38.3%","13.1%","13.0%"

""



Sample Sub-Capacity Report Disclaimer and Hash (W5) Section

```
"=W5====="
```

```
""
```

```
"This report is prepared by the IBM System z customer identified above ("Customer") or  
its authorized designee, and such"
```

```
"Customer is solely responsible for the completeness and accuracy of information and data  
used to create this report."
```

```
"Specifically, IBM makes no representations or warranties regarding the contents or  
accuracy of this report."
```

```
"Any questions regarding the contents of this report should be directed to the Customer."
```

```
""
```

```
"A12212402E50127F50702H52950K51067"
```



Enhancements to z/VSE Capacity Measurement Tool (CMT) and Sub-Capacity Reporting Tool (SCRT)

z/VSE 4.2: Support for reporting of z/VSE system image capacities of less than one MSU

- APARs for z/VSE 4.1 and z/VSE 4.2 (DY47027 and DY47029)

z/VSE 4.3: Support for z196, z114, zEC12, zBC12, and Static Power Save Mode

- APARs for z/VSE 4.1 and z/VSE 4.2 (DY47110 and DY47111)
- Static Power Save Mode only available on z196 and zEC12
- Includes support for CMT data files that exceed 32767 tracks on ECKD disks in CMT Report Tool (IJB CMTRP)
- CMT message 0S48 is highlighted and retained on the console (z/VSE 4.3 onwards)

z/VSE 5.1: Support for date and time offsets in CMT Report Tool (IJB CMTRP)

- APARs for z/VSE 4.1, z/VSE 4.2, and z/VSE 4.3 (DY47196, DY47194, and DY47197)
- Useful in case of e.g. end-of-year processing tests

SCRT V20.1.0: Support for z/VSE V4 and V5 on one machine

Latest version of SCRT: SCRT V21.2.0 released on 04/10/2013



z/VSE Capacity Measurement Tool (CMT) Hints & Tips

- CMT files (IJSYSCC, IJSYSC1, IJSYSC2):
 - Must not be shared among multiple systems (for write); each system requires its own set of files
 - Can reside on a shared disk as long as disk sharing is set up correctly:
 - IPL DLF statement (one single shared lock file)
 - IPL ADD statement with option SHR (for each shared disk)
 - Must not be relocated (neither moved on the disk nor to another disk)
 - It is recommended to stick to the default configuration values (e.g. number of tracks or blocks specified for ECKD and FBA disks)
- CMT ID (=SYSID in z/OS) must be unique among all systems and across all operating systems:
 - If every machine (=CPC) is processed on its own SCRT run, then the IDs must only be unique for each machine (this is the preferred solution)
 - If multiple machines (=CPCs) are to be processed in one SCRT run, then the IDs must be unique among all machines being processed together
- SCRT User's Guide: <http://www.ibm.com/systems/z/resources/swprice/subcap/scrt/>

Programming APIs

Capacity Measurement Tool (CMT) API

- Introduced with z/VSE 4.3
- Provides CMT data from the last measurement interval:
 - CMT Status: Active / Inactive
 - CMT ID
 - Timestamp of Data Update: Time-of-Day (TOD)
 - 4 Hour Rolling Average (4HRA) of the Utilization in MSU/h or 10KSU/h
- HLASM macros MAPCMTDT and GETCMTDT
- Documented in *z/VSE Supervisor Calls and Internal Macros*



Programming APIs

Query Virtual Server (QVS) API

- Provides information on the system:
 - Capacity of the CEC, LPAR, and z/VM Guest in MSU/h
 - LPAR Name and ID
 - z/VM Guest Name
- Available under z/OS, z/VM, and z/VSE
 - HLASM macros IRAQVS and SYSEVENT QVS
 - C header file IWMQVSH
- Documented in *z/VSE Supervisor Calls and Internal Macros*
- New with z/VSE 5.1:
 - Support for PR/SM „relative“ hard-capping based on weights when running in LPAR
 - Transparent pass-through of z/VM QVS data when running under z/VM (requires at least z/VM 5.4)
 - APAR DY47479: Support for PR/SM „absolute“ hard-capping in CPU units on zEC12 and zBC12 when running in LPAR



References

- Midrange Workload License Charge (MWLC) for z/VSE
<http://www.ibm.com/systems/z/os/zvse/howtobuy/mwlc.html>
- Advanced Entry Workload License Charges (AEWLC) for z/VSE
<http://www.ibm.com/systems/z/os/zvse/howtobuy/aewlc.html>
- Sub-Capacity Reporting Tool (SCRT)
<http://www.ibm.com/systems/z/resources/swprice/subcap/scrt/>
 - Download SCRT for z/OS and z/VSE
 - Download *Using the Sub-Capacity Reporting Tool* (“SCRT User's Guide”), SG24-6522
 - SCRT Support Team: scrt@us.ibm.com
- License Management Support (LMS)
<http://www.ibm.com/software/lms/>
 - Subscribe to the LMS/SCRT e-mail newsletter (announcements, updates)
 - LMS Support Team: kmsweb@dk.ibm.com

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Arabic

Merci
French

Obrigado
Brazilian Portuguese

THANK YOU
English

Gracias!
Spanish

多谢
Simplified Chinese

Danke
German

多謝
Traditional Chinese

ありがとうございました
Japanese

감사합니다

Thank You

Questions



Please forward your questions or remarks to

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