



Virtual Db2 user group: Newsletter 2



Welcome to the Virtual Db2 user group newsletter. The Virtual Db2 user group at itech-ed.com/virtualdb2 is an independently-operated vendor-neutral site run by and for the CICS user community.

Virtual Db2 user group presentation

The first webinar from the Virtual Db2 user group was entitled, "Understanding Your Rolling 4 Hour Average to Tune Db2 and Lower Mainframe Costs". It was presented in January by Craig Mullins, president and principal consultant of Mullins Consulting.

Craig is president and principal consultant of Mullins Consulting, Inc. where he focuses on data management strategy and Db2 consulting. He has been named by IBM as a Db2 Gold Consultant and an IBM Champion for Data and AI. He writes the monthly DBA Corner column for *Database Trends & Applications* magazine.

Craig has over three decades of experience

in all facets of database systems development and has worked with DB2 for z/OS since V1. You may know Craig from his popular books.

Craig Mullins started his presentation by explaining that in order to get the most from tuning, you need to understand how pricing on a mainframe is calculated.

MIPS (Millions of Instructions Per Second) was, historically, the number of instructions that could be processed in a second of compute time, and was used to measure general computing capacity. MIPS is no longer an actual number of instructions but a way to measure computing capacity.

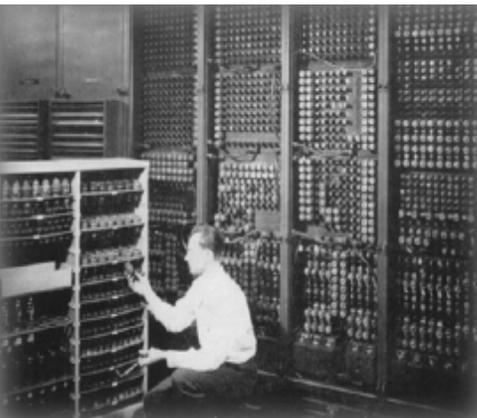
MSU (Million Service Units) is a measurement of the amount of processing work that can be performed in

an hour. One 'service unit' originally related to an actual hardware performance measurement, but that is no longer the case. A service unit is an imprecise measurement, and 1 MSU is approximately 8.5 MIPS for those who care. IBM publishes MSU ratings for every mainframe model.

Craig said that it is important to understand the difference between licensing and

Contents:

Welcome to the Virtual Db2 user group	1
Meeting dates	5
Db2 articles and blogs	5
Arcati Mainframe Yearbook	5
Co-sponsorship opportunity	6
About the Virtual Db2 user group	6



- ▶ **IMSU** : Instantaneous consumption of MSU for the LPAR
- ▶ **R4H** : Average of IMSU in 4 consecutive hours.

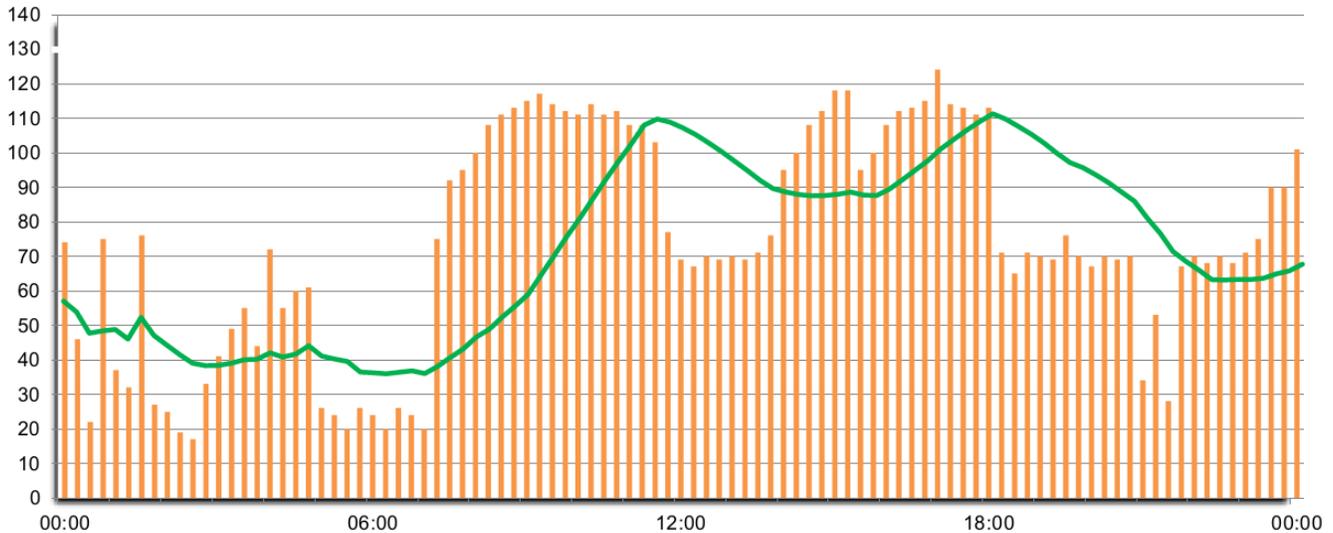


Figure 1: The Rolling 4 Hours Average (R4HA)

pricing. If you execute IBM zSeries software on a CPC (Central Processor Complex), you must have a license to do so. A licence for an IBM monthly licence charge product is specific to the product and a CPC with a particular serial number. The licence is sold in terms of MSUs. If you are executing a product on a 1500 MSU CPC, you must have a 1500 MSU licence, specifying the serial number of that CPC. The price for a product, ie how much you pay IBM each month, depends on the pricing metric that is used for that product.

Monthly License Charge (MLC) products include z/OS, Db2, CICS, IMS, MQSeries, and COBOL. Pricing and terms and conditions for MLC products are based on the pricing metric you select. Pricing metrics can roughly be grouped into two categories: full capacity and sub-capacity.

Under a full capacity-based metric, all software charges are determined by the capacity of the CPC in which the product runs. Parallel Sysplex License Charges (PSLC) and zSeries Entry License Charges (zELC) are

examples of full capacity-based metrics.

Under a sub-capacity metric, software charges for certain products are based on the utilization capacity of the LPARs in which the product runs. Workload License Charges (WLC) and Entry Workload License Charges (EWLC) are examples of sub-capacity-capable pricing metrics.

One of IBM's latest mainframe software pricing methods is Tailored Fit Pricing (TFT), which is designed to be more like cloud pricing. It's based

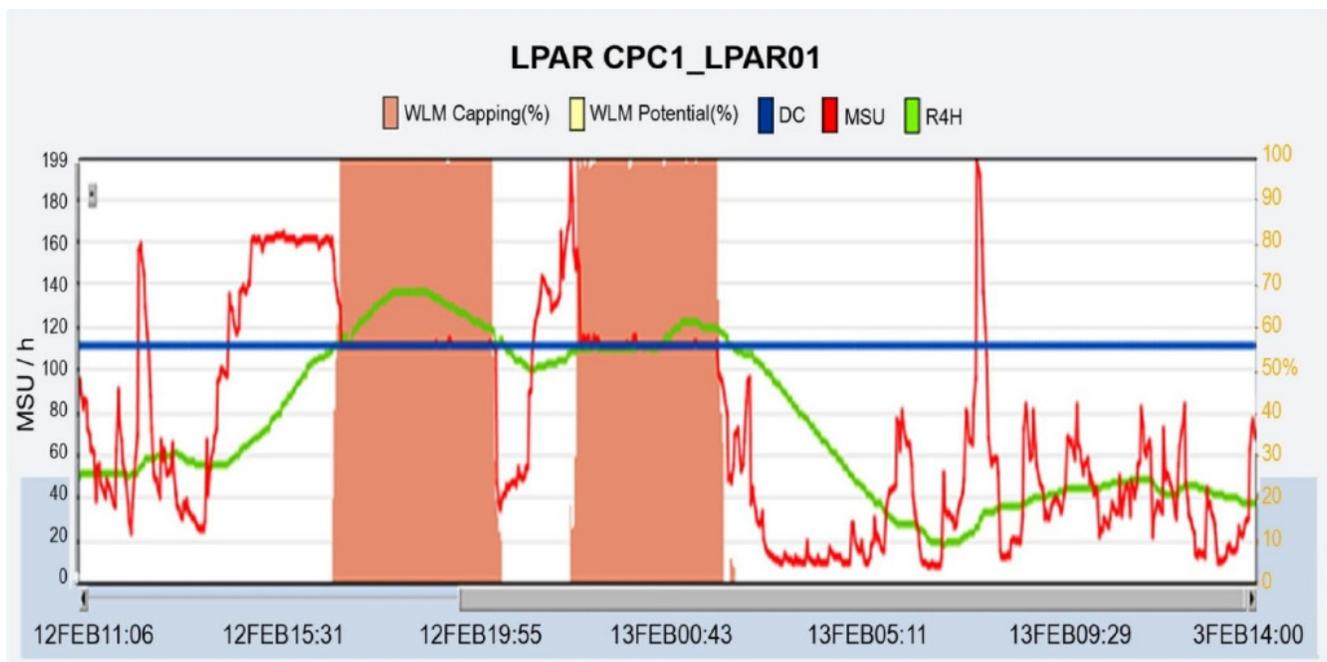


Figure 2: The Soft Capping Rule

on the overall hardware consumption, not LPAR rolling four-hour average (R4HA). A baseline of overall MSU consumption for the year is taken along with an agreement to consume more MSUs in the upcoming years. Discounted rate for MSUs are applied, and monthly billing is predictable and the same regardless of monthly variations in usage.

Craig went on to say that your charges for products that use sub-capacity pricing are based on how much the LPARs in which the products run utilize system resources, rather than on the full capacity of the CPC. You can purchase hardware capacity

for future needs without incurring an immediate increase in your software bill. If your usage decreases when business is slow, your software bill decreases with it. If your usage is seasonal, your monthly software bills are lower during periods of lower usage. You pay for capacity on a rolling four-hour average, not on the maximum capacity reached.

Craig then looked at sub-capacity in detail. He explained that the rolling four-hour average represents the average consumption (in MSU) of the LPAR during the last 4 hours (see Figure 1). Every 5 minutes IMSU (Instantaneous consumption

of MSU for the LPAR) is measured. The R4HA is an average of the past 48 IMSU metrics. This is not product usage-based pricing; instead, it is a bit of a hybrid.

Craig went on to explain how the calculation is made at a site with three LPARs, and then explained that products will be charged based on the peak period of the sum of the R4HA for the LPARs in which they run.

Next Craig looked at Defined Capacity (DC), saying that it is set in the Hardware Management Console (HMC) and is used to control billing. It does not enforce capping and is not mandatory. The z/OS Workload Manager

(WLM) calculates and monitors the R4HA. If DC is set to a non-zero number, WLM monitors the R4HA and ensures that the R4HA is less than or equal to the DC. Of course, WLM also manages your workloads based on settings/goals. The Processor Resource/ Systems Manager (PR/ SM) enforces the soft cap when WLM determines it is needed.

The Sub-Capacity Reporting Tool (SCRT) is a no-charge IBM tool that reports required licence capacity for sub-capacity-eligible products. The SCRT indicates the required licence capacity (in MSUs) of each sub-capacity-eligible product. The SCRT cross-references LPAR utilization and product execution by LPAR to determine the maximum concurrent LPAR four-hour rolling average utilization – the highest combined utilization of LPARs where each product executes during the reporting period. Sub-capacity products are charged based on the rolling 4-hour average utilization of the LPARs in which the sub-capacity products execute. The sub-capacity report determines the required licence capacity by examining, for each hour in the reporting period: the four-hour rolling average

utilization, by LPAR; and which eligible products were active in each LPAR.

Each hour, the R4HA is compared to the defined capacity (DC). If the DC is set, the SCRT uses the lower of the two values for the utilization value for the z/OS system for that hour.

The SCRT uses the following SMF records: SMF 70-1 and SMF 89-1 / 89-2

The SCRT is computed on a monthly basis, from the second day of the month at 0h00 to the first day at 24h00 of the following month. R4HA averages are calculated for each MLC product, each hour, for each LPAR, for the month.

The soft capping rule is that when the R4HA becomes greater than or equal to the DC, the LPAR is capped. That means that the IMSU consumption will not be able to exceed the DC anymore until the R4HA becomes lower than the DC (see Figure 2).

With that in mind, Craig Mullins looked at some tuning tactics to save money. SMF 89 records indicate when a product is up and running, and when it is down and inoperative. Therefore, when you are not using the software, if at all possible,

shut it down so it won't be charged if the peak occurs. For example, if the peak R4HA regularly occurs during the batch cycle between midnight and 4am, and CICS is not active between the 10pm and 6am, consider bringing CICS down before midnight and up after 4am. Of course, this is not always feasible, and requires planning, sufficient time, and appropriate products.

Understand where your monthly peaks are and attack the peaks. The SCRT reports the peak for each LPAR, as well as the next highest peak usage time. So, when Db2 contributes to the peak, use Db2 tuning techniques to reduce consumption. You do not have to focus on the absolute peak hour because it is a FOUR HOUR rolling average. That means anything running at the peak hour and the following four hours is fair game for tuning to reduce cost! When you reduce one peak, find the next and attack that one. You may be able to tune Db2 usage and reduce the cost of other products that run in the same LPARs, eg z/OS, CICS, IMS, COBOL, etc. Similarly, you may be able to tune non-Db2 usage and reduce the cost of Db2.

What if your monthly R4HA peak is in the batch window?

Are you meeting your batch SLAs? Consider what can be done to reduce MSU consumption during batch processing, eg COMMIT processing, concurrency and locking, and SQL tuning.

What if your monthly R4HA peak is during your daily transaction processing? Have you optimized your transactions? Is the workload appropriate for your system? Consider what can be done to reduce MSU consumption during OLTP, eg CICS tuning, RDO specifications, SQL tuning.

Tune the SQL/applications. Most relational tuning experts agree that the majority of performance problems with relational database applications are caused by poorly-coded application code and SQL. Other Db2 tuning options include: tuning the database; tuning the subsystem; and tuning the environment.

For SQL/application tuning, identify the heaviest resource consuming SQL during the peak processing time(s). Identify tuning opportunities. And review access paths and tune:

- Indexing, eliminating scans
- Let SQL do the work (not the program)

- Avoid sorting when possible
- Favour Stage 1 and Indexable predicates
- Review locking considerations – UOW, lock avoidance, COMMIT, isolation level (dirty read)
- Review cursors – multi-row FETCH.

A copy of Craig Mullin's presentation is available for download from the Virtual Db2 user group website at <https://itech-ed.com/virtualdb2/presentations/Db2TuningJan23.pdf>

You can see and hear the whole user group meeting at <https://youtu.be/uOrg27fVfP>

Meeting dates

The following meeting dates have been arranged for the Virtual Db2 user group:

- On 28 March we have Chad Reiber, Principal Software Consultant at BMC Software, who will be discussing, "Db2 z/OS Recovery – How Best Practices Have Changed to Address New Threats".
- The meeting after that is on 23 May, when Canvas Botha will be discussing,

"Writing high performance SQL statements".

We are using Zoom for the user group meetings.

Db2 articles and blogs

Consistency of zParms in Db2 Data Sharing Groups by Emil Kotrc on the IDUG blog site (12 January 2023). You can find the article at: <https://www.idug.org/blogs/emil-kotrc1/2023/01/12/consistency-of-zparms-in-db2-data-sharing-groups>

DSNACICS. Why use DSNACICS? calling DSNACICS through REST API – A user experience by Brian Laube on the IDUG blog site (6 January 2023). You can find the article at: <https://www.idug.org/blogs/brian-laube1/2023/01/06/dsnacics-why-use-dsnacics-calling-dsnacics-through>

Arcati Mainframe Yearbook

The 2023 edition of the Arcati Mainframe Yearbook is now available. The Yearbook stands out as an excellent reference work for all IBM mainframe professionals. The mainframe evolution section includes a hardware timeline, and a graphic illustrating mainframe operating system evolution.

The glossary of terminology section explains what all those acronyms stand for. There's a guide to sources of information for IBM mainframers. The vendor directory section contains an up-to-date list of vendors, consultants, and service providers working in the z/OS environment. The mainframe strategy section contains articles by industry gurus and vendors. And the mainframe user survey illustrates just what's been happening at users' sites. It's a good way for mainframers to compare what they are planning to do with what other sites have done. The other great thing about the Yearbook – as

far as many of the 21,000 people who download it are concerned – is that it is completely FREE. You can download it from <https://itech-ed.com/arcati/>

Co-sponsorship opportunity

Supporting the user community is an important part of the relationship between software vendors and their customers. The Virtual Db2 user group is new and is offering this opportunity to co-sponsor the user group. If this is of interest, please contact me (trevor@itech-ed.com).

About the Virtual Db2 user group

The Virtual Db2 user group was established as a way for individuals using IBM's Db2 for z/OS to exchange information, learn new techniques, and advance their skills with the product.

The website at itech-ed.com/virtualdb2 provides a central point for coordinating periodic meetings (which contain technically-oriented topics presented in a webinar format), and provides articles, discussions, links, and other resources of interest to IBM Db2 practitioners. Anyone with an interest in mainframe Db2 is welcome to join the Virtual Db2 user group and share in the knowledge exchange.

To share ideas, and for further information, contact trevor@itech-ed.com.

The Virtual Db2 user group is free to its members.

