Container Pricing

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Welcome!

- Thanks for joining us today.
- Who are we?
  - Watson & Walker was founded in 1988 (30 years ago!) by Cheryl Watson and Tom Walker.
  - Known for Cheryl Watson's Tuning Letter, Cheryl's WLM Quickstart policy, and Cheryl's performance classes.
- More recently, in response to customer requests to help them understand their SW bills and manage their costs, we have expanded our team to include some world-class pricing experts.
- For more information about our company, please see our Tuesday session 23716 – *Cheryl Watson's Hard Truths on SW Pricing*.

Container Pricing

- IBM announced a new Container Pricing software pricing *infrastructure* and three new pricing options on the same day as the z14 announcement.
- The Container Pricing infrastructure is seen by IBM as providing the base for radical new options for how customers will pay for software on z/OS:
  - This is *not* just another narrowly-targeted pricing option – Container Pricing delivers an underlying infrastructure that enables *many* different options.
  - The (lofty) aspiration is that Container Pricing will remove restrictions that customers have complained about in earlier pricing options (such as the need to use a dedicated LPAR for zNALC) and eliminate the complexity that dissuades customers from using the existing pricing options (MWP).

W&W Take on Container Pricing

- Determining the impact that adding a new application to z/OS could have on your SW bills is difficult, at best:
  - This is the *cost* of running in a highly shared environment.
  - The *benefit* of running in that environment is that applications that run outside the peak R4HA (“white space”) can cost as little as zero (with a few caveats).
  - However, for application owners that want a definitive cost for a new application before it is even written, it is fair to say that determining the cost in advance can be extremely complex.
- The *perception* (true or otherwise) is that the pricing for other platforms is much simpler.
  - It would also be simple to price a dedicated z CPC that uses full-capacity licenses. However, such a configuration would not benefit from any of the advantages of a shared environment. It would also be a lot more expensive than nearly any alternative.

W&W Take on Container Pricing

- There is also the concern that adding a new application to z/OS will increase the cost of products it doesn't even use.
  - E.g. if you add 100 MSUs of MQ application to an existing CICS LPAR, that could drive up your CICS bill even though the new application doesn't use CICS.
  - There ARE ways to protect yourself from this impact (dedicated LPARs, zCAP, etc), but they are viewed by many customers as being more complex than they are worth, and lacking in flexibility.
- Other inhibitors include:
  - The perceived high cost per transaction of z/OS compared to distributed platforms.
  - The high cost of providing development and test environments on z/OS (because those environments tend to require the complete software stack).

Container Pricing

New Terminology

Applications that are treated as a single entity in conjunction with Container Pricing are called ‘Solutions’.

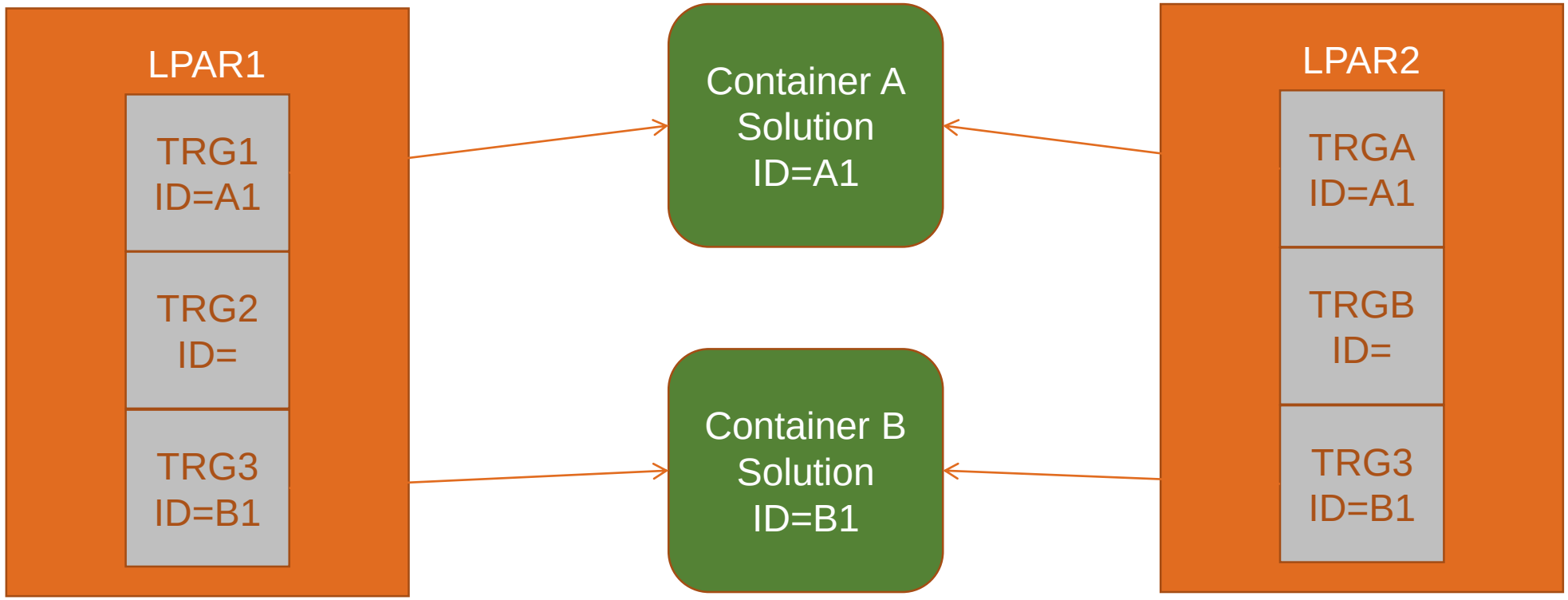
Each ‘Solution’ must be approved by IBM. Approved solutions are assigned a unique, 64-byte, Solution ID which you download from IBM’s LMS webite. This Solution ID is key to the ‘automation’ of the whole definition, tracking, reporting, and billing process.

A ‘Container’ is a logical construct, made up of 1 or more dedicated LPARs and/or WLM “Tenant Resource Groups” associated with a Solution. There is a one-to-one relationship between Containers and Solutions IDs.

Note that this has **NOTHING** to do with Docker Containers or Secure Service Containers!

Container Pricing

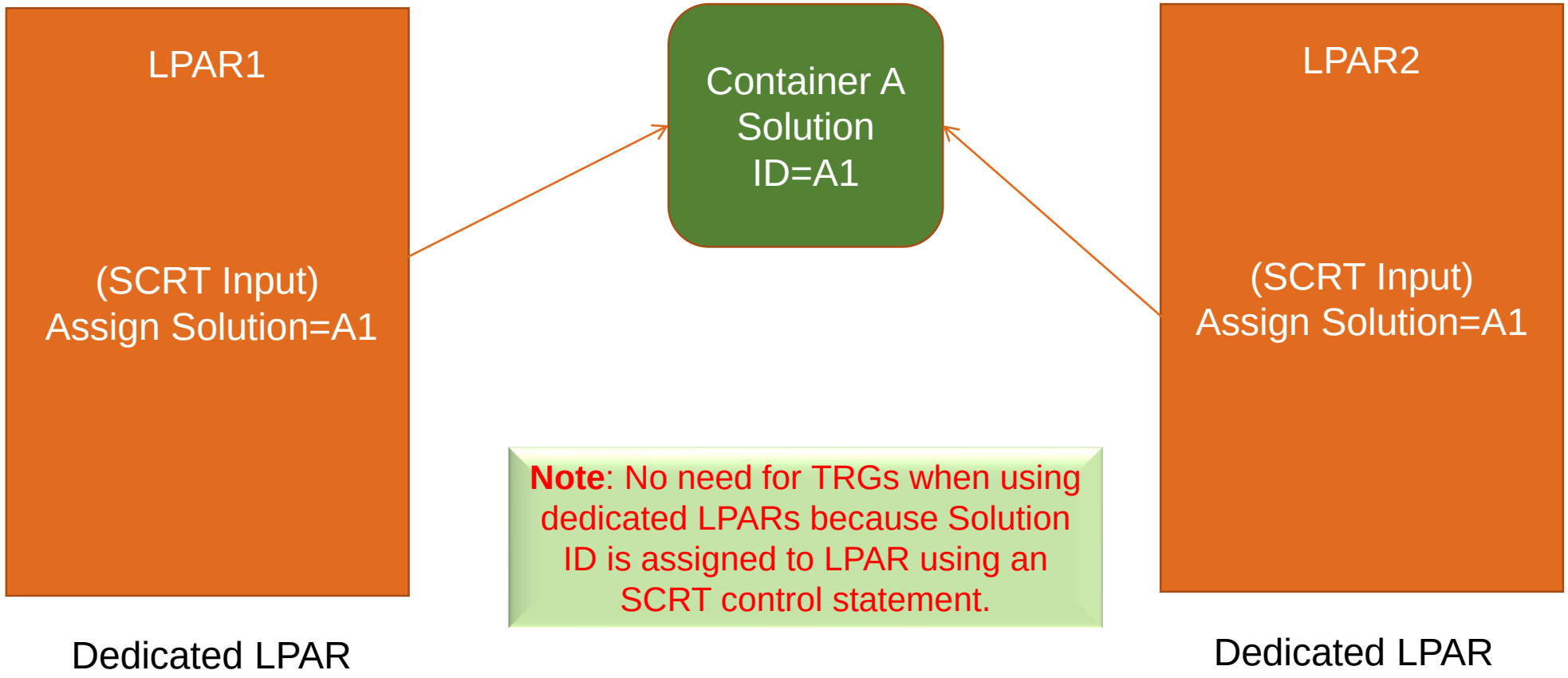
- IBM's aim is to provide complete flexibility for where you run the new application – could be collocated with applications that are not in the same container (similar to zCAP)….



Courtesy of Andrew Sica

Container Pricing

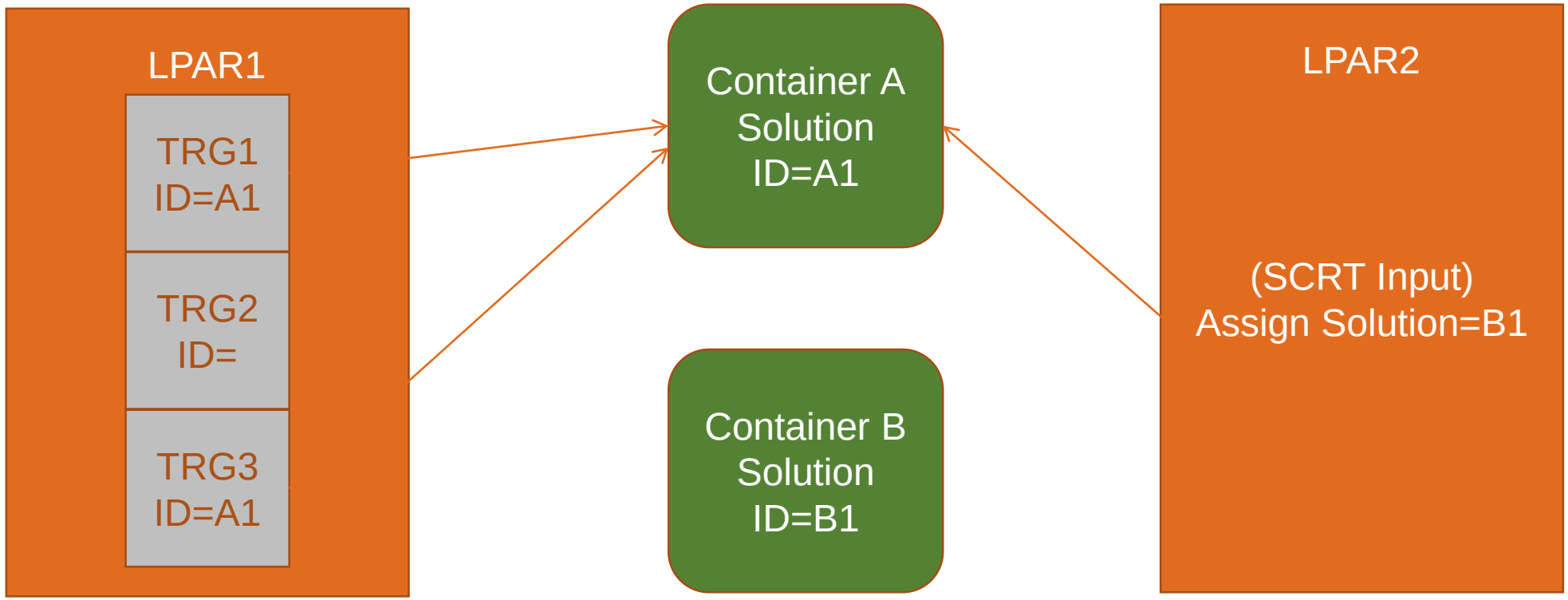
- Or in dedicated LPARs, like zNALC….



Courtesy of Andrew Sica

Container Pricing

- Or a combination of dedicated LPARs and collocated applications (aspects of both zCAP and zNALC).



Shared LPAR

Dedicated LPAR

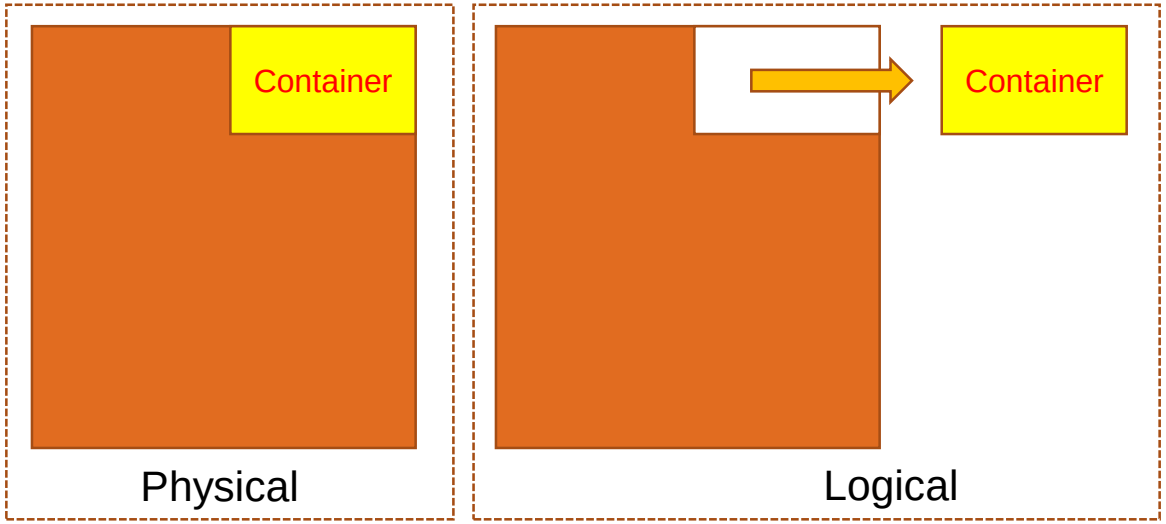
Courtesy of Andrew Sica

Container Pricing

- What's so different from a technical point of view?
  - Some existing pricing offerings require the customer to obtain the CPU usage info for the application from SMF and get that into a format that can be input to SCRT.
  - The intent of Container Pricing is that:
    - For collocated applications that use Container Pricing, the association of work with specific containers is handled in Workload Manager.
    - The gathering of resource consumption information (R4HA) for the container is handled by Workload Manager.
    - This information is written to SMF type 70 records by RMF or CMF.
    - The interfaces used by products to save information in the SMF type 89 records (IFAUSAGE and IFAEDREG) are enhanced to allow container-related information to be saved.
    - The SCRT program enhanced to extract all this info from the type 70 and 89 records and create reports that deduct the container MSU consumption, with the *intention* that the R4HA for the existing applications would be the same that it would be if the container workload didn't exist.

Container Pricing

- The impact of this is to logically break your workloads in two from a pricing perspective:
  1. The solution using Container Pricing will have one price (possibly a fixed price), determined based on the rules associated with that offering.
  2. The *actual* R4HA of the container will be removed from the R4HA for every MLC product used in the LPARs that the container runs in. The result of that adjustment is used as the basis for the price of all non-container work.
     - The intention is that the cost of all work outside the container should be close to what it would have been if that new solution did not exist.



Container Pricing

- Container pricing currently consists of three specific offerings:
  1. Application Development and Test Solution – a fixed price for z/OS-based development and test workloads, allowing you to grow those workloads to up to 3x today's MSUs with no direct increase in MLC cost for those workloads. Conceptually similar to Solution Edition Development offering, but without the requirement for dedicated LPAR(s).

We believe that this is the most popular solution, especially for customers with dedicated dev/test LPARs.

Container Pricing

- Dev/Test Container solution addresses following issues:
  - Customers are moving application development off z/OS due to high cost of development environments (which typically have to contain EVERY product you are licensed for).
    - If application development moves to another platform, the next logical step is to move the production development to that other platform.
  - In an effort to control costs, customers screw down DevTest LPARs so severely, they become unusable during peak hours.
    - This adversely impacts programmer productivity, and unfairly gives z/OS a reputation for poor performance and availability.
  - Rather than focusing on enabling new functions and new technology, and optimizing response times, technicians are consumed by trying to minimize costs.

Container Pricing

- Container pricing currently consists of three specific offerings:
  2. New Application Solution – allows clients to add new, approved, z/OS workloads without directly impacting the R4HA of existing workloads. The new application can be deployed in an existing LPAR, across multiple existing LPARs, or in a standalone LPAR – *whichever makes the most sense from a business and technical perspective*. Also, the price for the new application will be 'fixed', based on your estimate of the container size. This is seen by IBM as a strategic replacement for zCAP and IWP.

Because of the difficulty of sizing new applications early in their lowest usage (potentially before they are even written), we believe that this will not be a very popular option. We recommend that customers consider alternatives such as zCAP pending additional pricing options in the foreseeable future.

Container Pricing

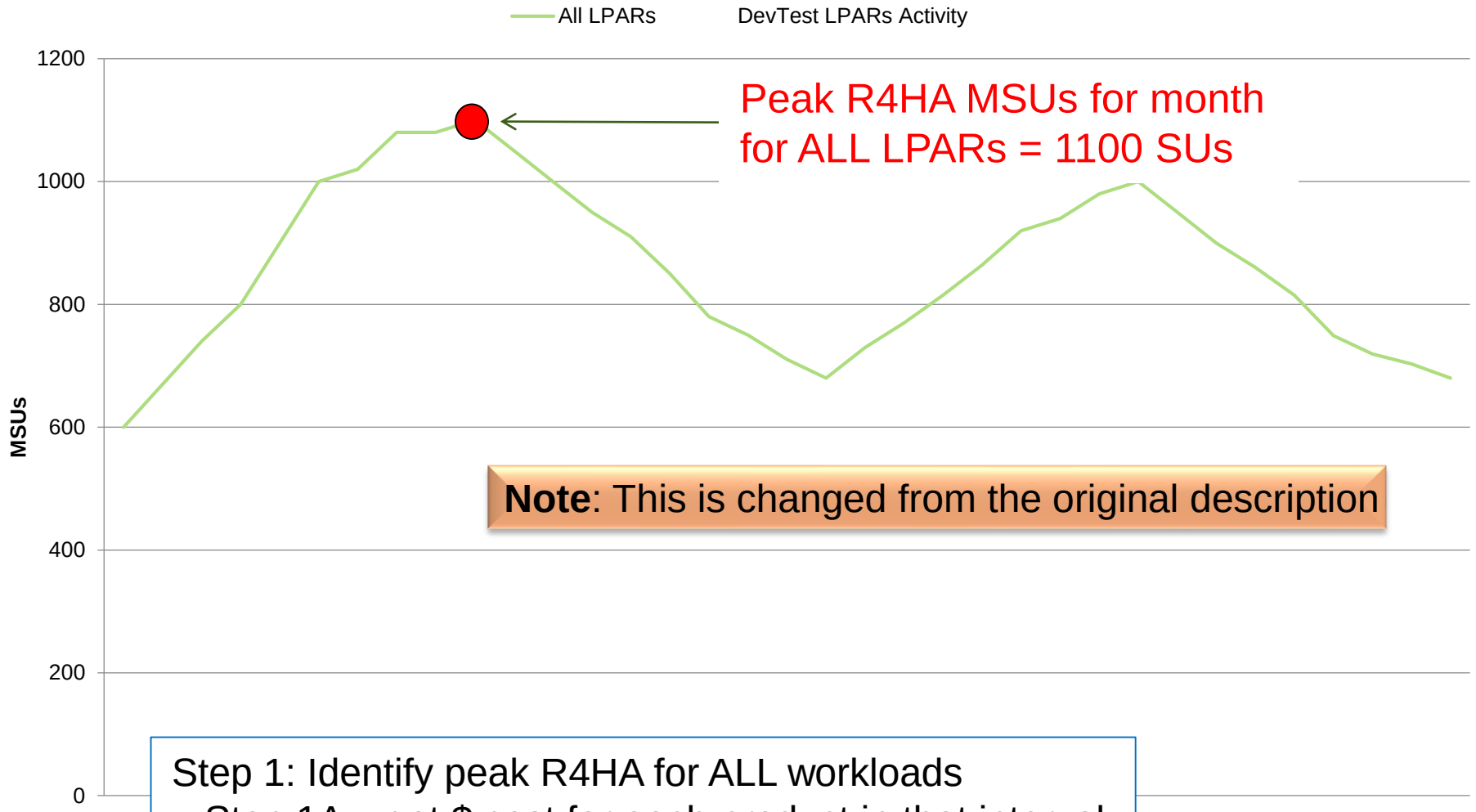
- Container pricing currently consists of three specific offerings:
  3. Payments Pricing Solution – a new “per payment” price metric that is tied directly to payment volumes, with collocated software and separate LPAR software-hardware versions. This is specifically for IBM’s Financial Transaction Manager (FTM) software.

  This is a very niche product. It is mainly of interest because it introduces the concept of paying for a product based on a business-related metric (number of payments) rather than capacity consumption.

Container Pricing

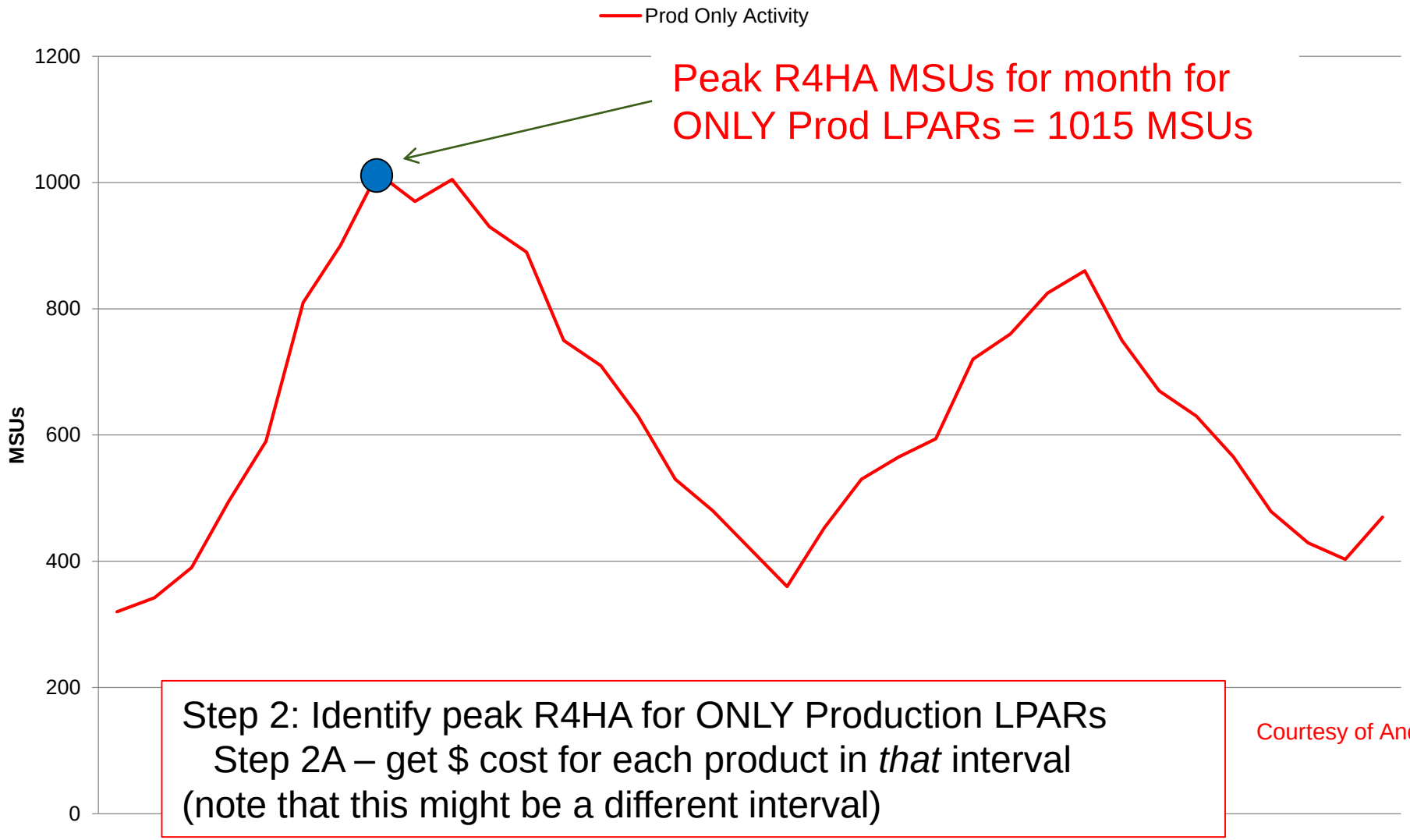
- Dev/Test Solution:
  - Customer chooses a max DevTest container size –1x, 2x, or 3x current peak R4HA (called the “DevTest MSU Base”) for DevTest workload/LPARs – this max is called the “DevTest Solution MSUs”.
  - IBM calculates current cost of that workload (see next slide), averaged over 3 months.
  - Price for MLC SW in that container is fixed at that level for an indeterminate term. As long as peak R4HA for that container does not exceed the agreed amount, the MLC cost for that container remains fixed.
  - Customer must have (or purchase) sufficient Value Units for any IPLA products used by DevTest, based on the **DevTest Solution MSUs**.

Dev/Test Solution example



Courtesy of Andrew Sica, IBM

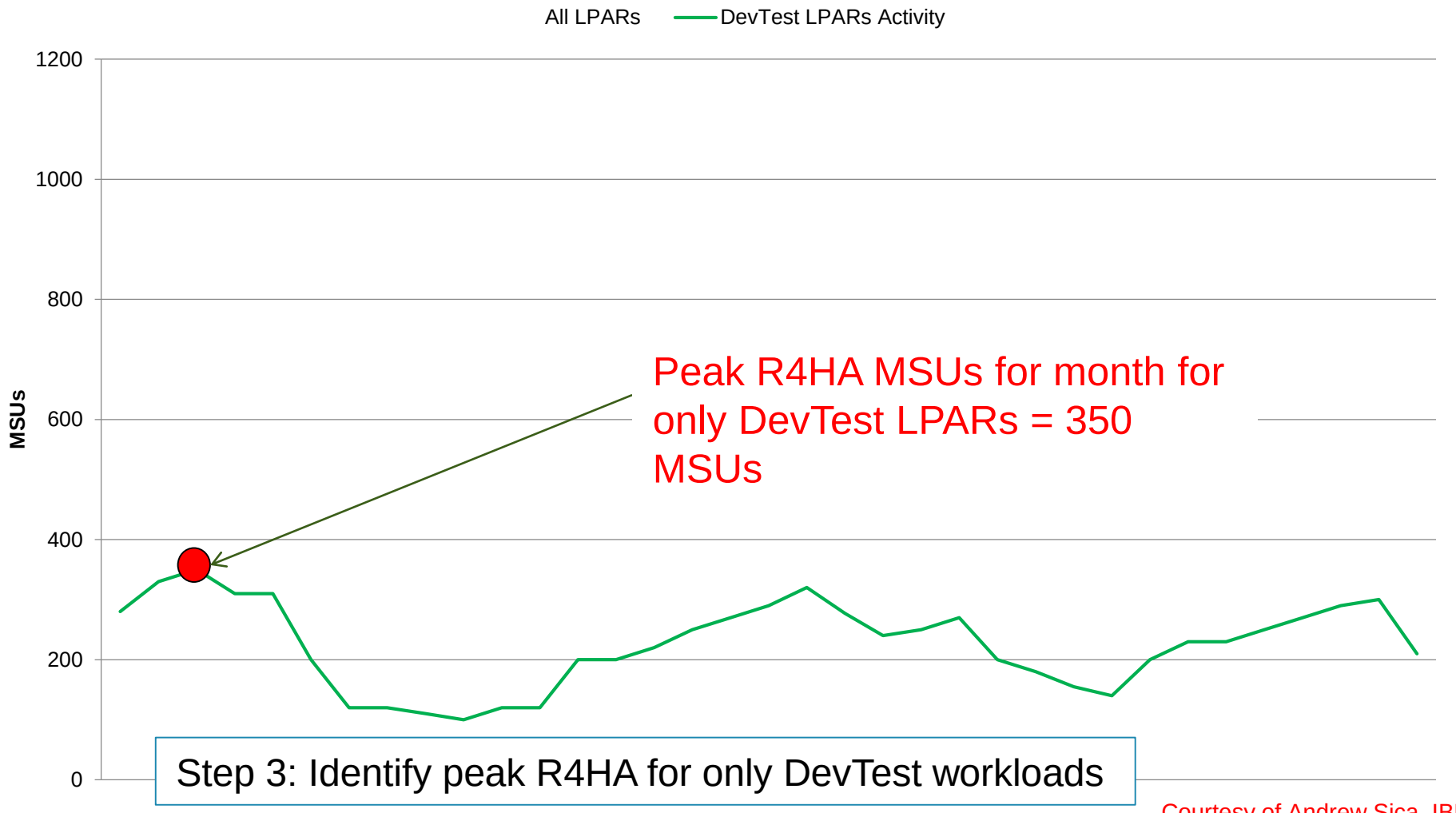
Dev/Test Solution example



Step 2: Identify peak R4HA for ONLY Production LPARs
Step 2A – get $ cost for each product in *that* interval
(note that this might be a different interval)

Courtesy of Andrew Sica, IBM

Dev/Test Solution example



Courtesy of Andrew Sica, IBM

Dev/Test Solution

What does IBM do with these numbers?

Container Cost (for each product!) =
Cost of Peak R4HA for ALL LPARs (Step 1A) – Cost of Peak R4HA for Only Prod LPARs (Step2A)

DevTest MSU Base =
Peak R4HA for DevTest LPARs (Step3)

“Solution MSUs” =
DevTest MSU Base x 3

The customer-chosen multiplier in this case is 3x. Could also be 1x or 2x.

Future bill for Prod LPARs will be based on peak R4HA for just the Prod LPARs.

Container Pricing – DevTest Solution

Courtesy of Andrew Sica, IBM

NOT real numbers only for illustration

MSU & MLC Calculation (for MLC Pricing)	Sep	Oct	Nov	
(A) Total MSUs (Includes all LPARs: Producton & Test Dev)	1,020	1,000	1,015	
(B) Total MLC (actual paid BAU for all LPARs on machine)	$436.425	$431.944	$435.305	
(C) MSUs excluding Test Dev (Production workload)	720	710	715	3 Month
(D) Production Workload MLC (calculate from MSUs excluding Test Dev)	$412,898	$407,296	$409,536	Average
(E) Delta (BAU MLC minus Production MLC is incremental Test Dev MLC)	$23,528	$24,648	$25,768	$24,648
MSU Calculation (for LPAR 1x Base)	Sep	Oct	Nov	
(F) MSUs for Test Dev identified LPARs Only	800	790	810	800
(G) Available up to 3x MSU Test Dev growth				2400

(A) For each of the 3 months, get the MSUs from the normal SCRT reports containing all of the LPARs on the machines.
(B) Calculate the BAU MLC charges based upon the MSUs from (A).
(C) For each of the 3 months get the MSUs from the SCRT reports which Excluded the Test Dev LPARs (i.e. the Production workload).
(D) Calculate the MLC charges based upon the MSUs from (C).
(E) For each of the 3 months subtract the Production MLC of (D) from the BAU MLC of (B) to get the incremental cost of the Test Dev LPARs. Take the average of those 3 MLC deltas to determine the steady MLC to be charged for the Container (up through 3x use of MSUs).
(F) For each of the 3 months get the MSUs from the SCRT reports which Excluded the Production LPARs (i.e. the Test Dev workload). Take the average of those 3 MSU values to determine the 1x MSU value for the Test Dev workload.
(G) Multiply the 1x MSU value from (F) by a factor up to 3 to set the Solution MSUs.

MLC charged for up to 3x MSU use is subject to change if/when TTO changes and if/when MLC price action occurs.

Container Pricing - DevTest

- Observations:
  - The ‘3x’ description is somewhat misleading. In the previous example, the fixed cost for the DevTest container is based more or less on the DevTest MSUs at the time of the overall peak R4HA – about 300 MSUs in this case.
  - However, the 3x limit is applied to the peak R4HA for the DevTest LPARs – in this case, the peak for those LPARs was 800 MSUs. 3x 800 MSUs = 2400 MSUs.
  - So, IN THIS EXAMPLE, the maximum DevTest R4HA is actually 8x the number of MSUs that you are paying for.
    - If you don’t have much/any IPLA SW, or if all your IPLA SW is licensed at full capacity, this is a fantastic bargain.
    - But if your IPLA SW is licensed at sub-capacity, you might want to select a lower option than 3x.

Container Pricing - DevTest

- Observations:
  - If your Development and Test environments are growing AND they are significant contributors to your peak R4HA, this would seem to be a very attractive offering.
  - If you outgrow the 3x, additional MSUs will be priced at an 80% discount off CMLC prices.
    - For example, if 3X is 300 MSUs, and you go 1 MSU over, the price for that MSU would be based on the 301st point on the pricing curve, less 80%.
  - If you exceed the 3x, your fixed price is ratcheted up to that new level and stays there until it ratchets up again. That is, once you exceed the 3x, your bill will not revert to the original fixed price, even if your peak R4HA drops back below 3x.
  - Remember that qualification is not automatic – you must submit the required information to IBM and they can decide whether a given environment qualifies or not.

Container Pricing - DevTest

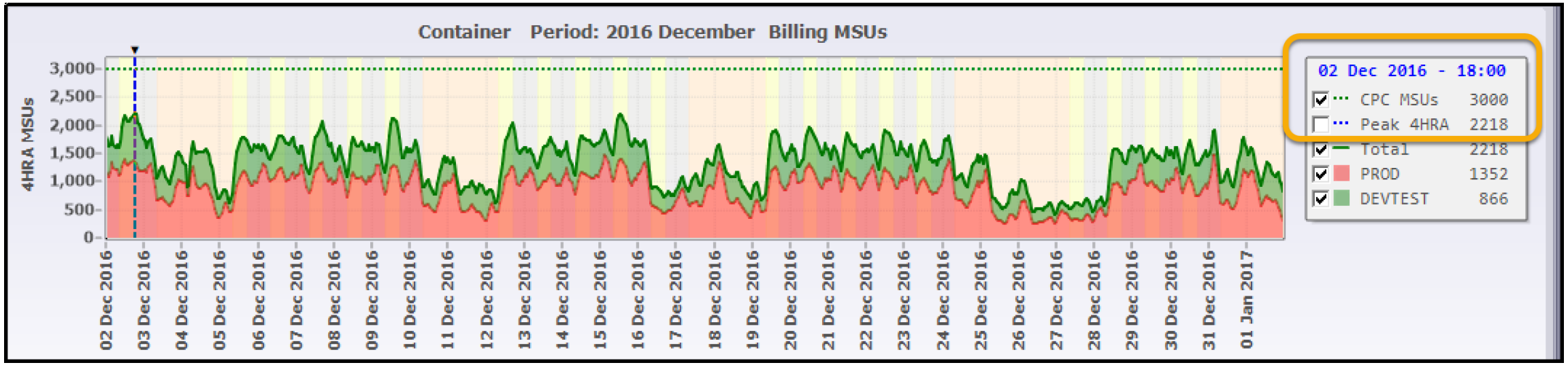
- Observations:
  - Even though the DevTest offering *supports* both dedicated DevTest LPARs and shared LPARs, in practice, identifying all your DevTest workloads in the WLM Classification rules could be a nightmare. Therefore, we expect this offering to be much more attractive to sites with dedicated test and development LPARs.
    - The *intent* of Container Pricing is that work in the DevTest container should not have a significant impact on the R4HA of the production LPARs.
    - However, the reality is that the more you share between your DevTest workload and your production (for example, a shared DB2 subsystem), the harder it is to assign 100% of the CPU consumption caused by the DevTest workload to the corresponding container.

Container Pricing - DevTest

- Observations:
  - The intent is that ALL DevTest LPARs should be included in the DevTest container – you cannot cherry-pick the ‘good’ candidates.
  - You need to be careful with LPARs used for performance/stress testing.
    - You could easily blow through the 3X limit if your base period does NOT include any high intervals due to such testing.
    - On the other hand, if the base period *does* include such intervals, your 3x limit might be very high, requiring you to buy a LOT more IPLA Value Units.
      - This might be an example of where it would be good for the 1x option.
    - While there is no impact on your DevTest MLC if you run up to the 3x limit, you might need to purchase additional HW capacity to deliver that capacity.

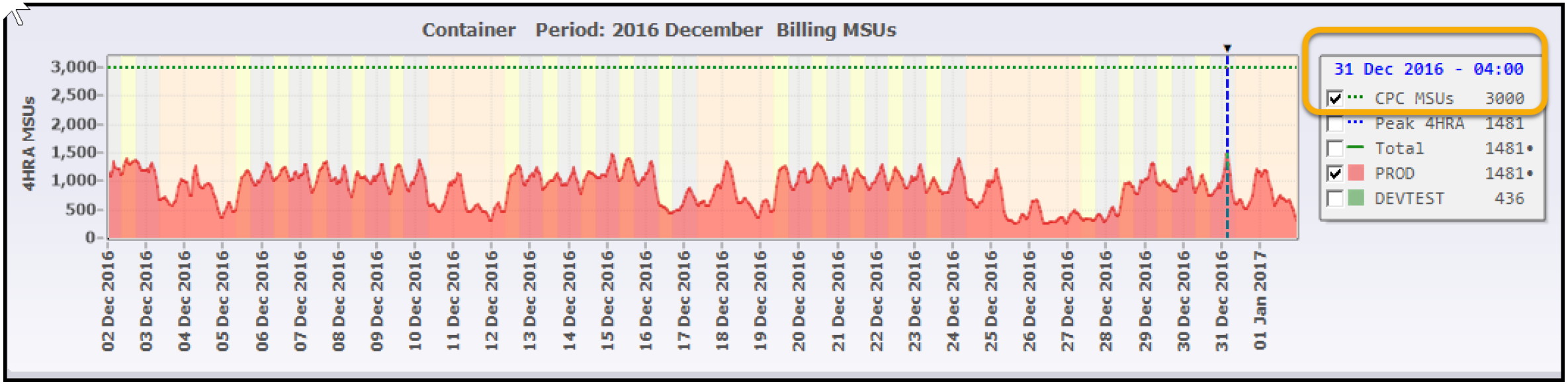
Container Pricing - DevTest

- Observations:
  - While there is no impact on your DevTest MLC if you run up to the 3x limit, you might need to purchase additional HW capacity to deliver that capacity.
  - Watch out for IPLA!
  - Watch out for ISV Products!
  - Watch out for increased CPU utilization!



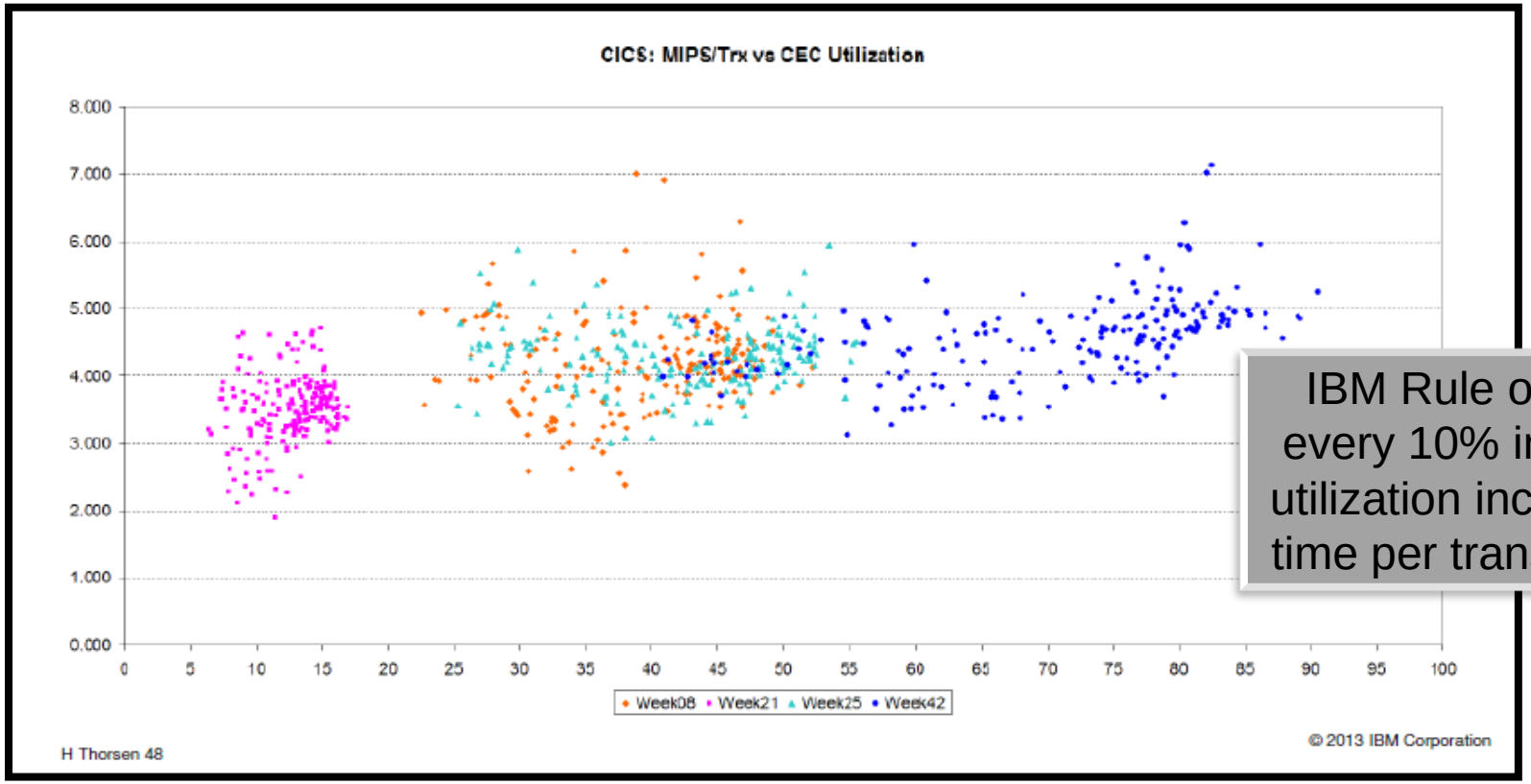
Container Pricing - DevTest

- Observations:
  - When you go to container pricing, your production R4HA might move!



Container Pricing - DevTest

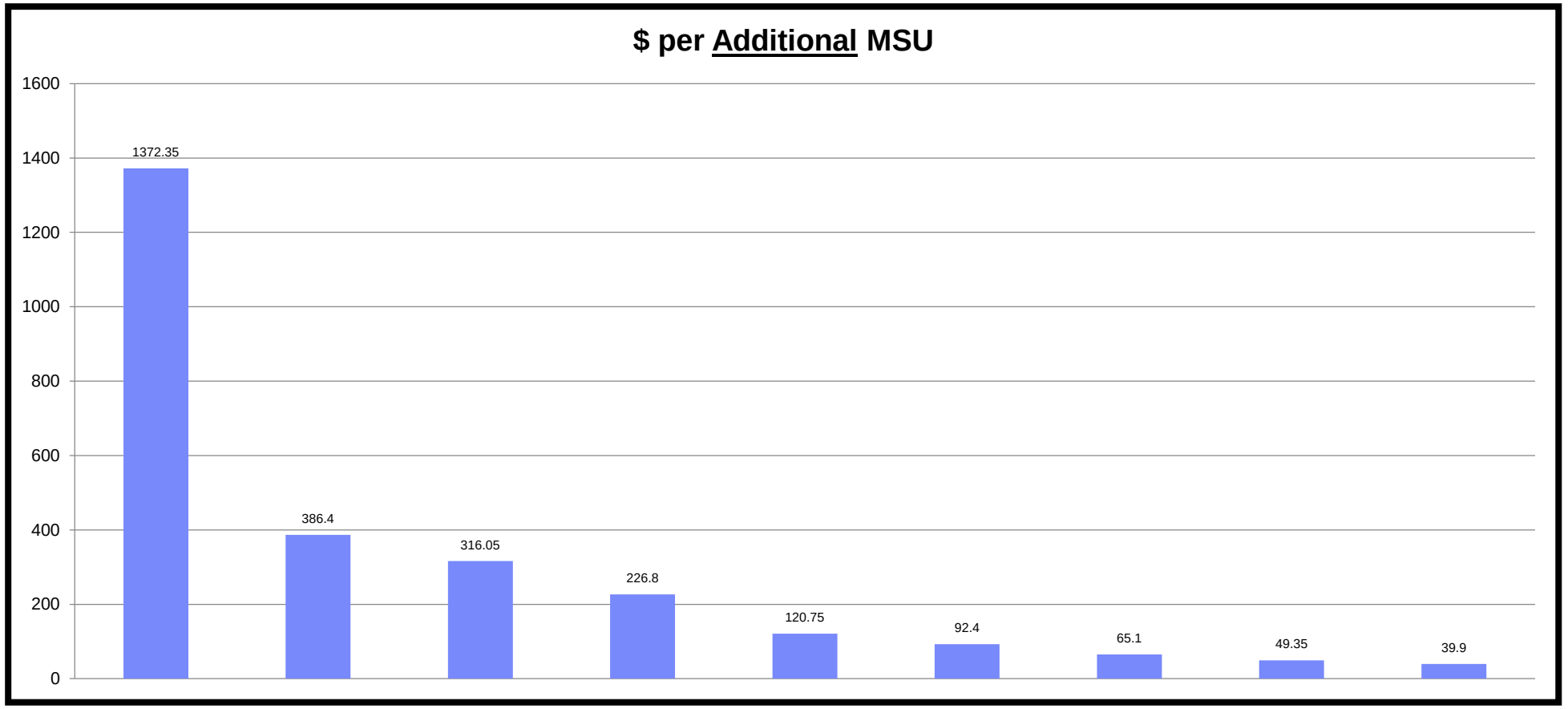
- Observations:
  - If you increase your DevTest work during your production peak, the CPU utilization will probably increase. That will increase the cost of production!



IBM Rule of thumb is that every 10% increase in CPU utilization increases the CPU time per transaction by 3-5%

Container Pricing - DevTest

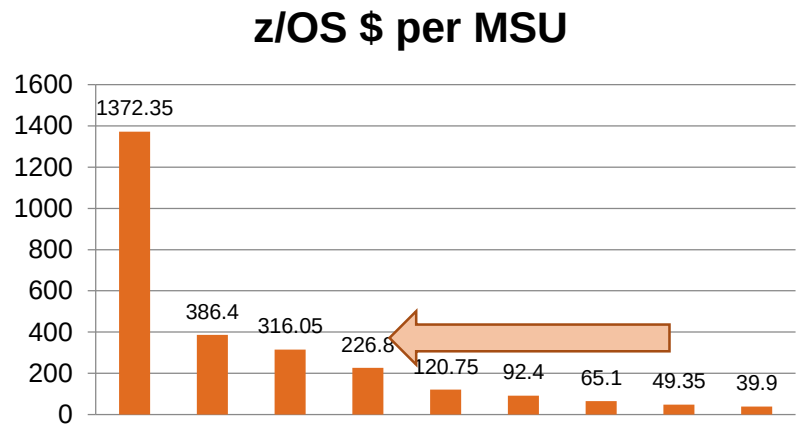
- Observations:
  - Depending where you are on the pricing curve, moving DevTest to a container could increase the incremental price of your production MSUs.



Container Pricing – New Application Solution

- The next Container Pricing option is the New Application Solution.
- Could be viewed as a combination of aspects of zCAP and MzNALC, with qualification criteria that are midway between those solutions.
- For applications that are NEW to z/OS in your company.
  - Specifically, growth of existing applications does **NOT** qualify.
- z/OS (5650-ZOS) is priced at 50% of MzNALC prices.
- All other IBM software must be IPLA.
- Customer specifies a container size (in R4HA MSUs) when applying for qualification.
  - That size is used to establish a fixed MLC for z/OS.
  - And it determines how many VUs are required for IPLA products.

Container Pricing – Considerations



- There is no free lunch….
- Once established, both offerings are priced COMPLETELY in isolation from the rest of your environment.
  - They are not aggregated, so will be priced on the lower, more expensive parts of the price curve (although z/OS price for NAS is tiny).
- You pay a more-or-less fixed price, just as if you had moved them to The Cloud.
  - If you move an application that only runs off-peak (and therefore contributes zero to your peak R4HA) to The Cloud, would the vendor run it for free? OF COURSE NOT.
  - Similarly, if you use a Container on z/OS, you pay, regardless of whether the work runs during the peak R4HA, or only in the off-peak.
- IF you subsequently find, after production experience with the new application, that it would cost less to run it as a 'traditional' program, you are not locked in to running it in a container forever – you could just stop assigning it to the container's TRG in WLM, but you have paid for the IPLA and don't get that money back.

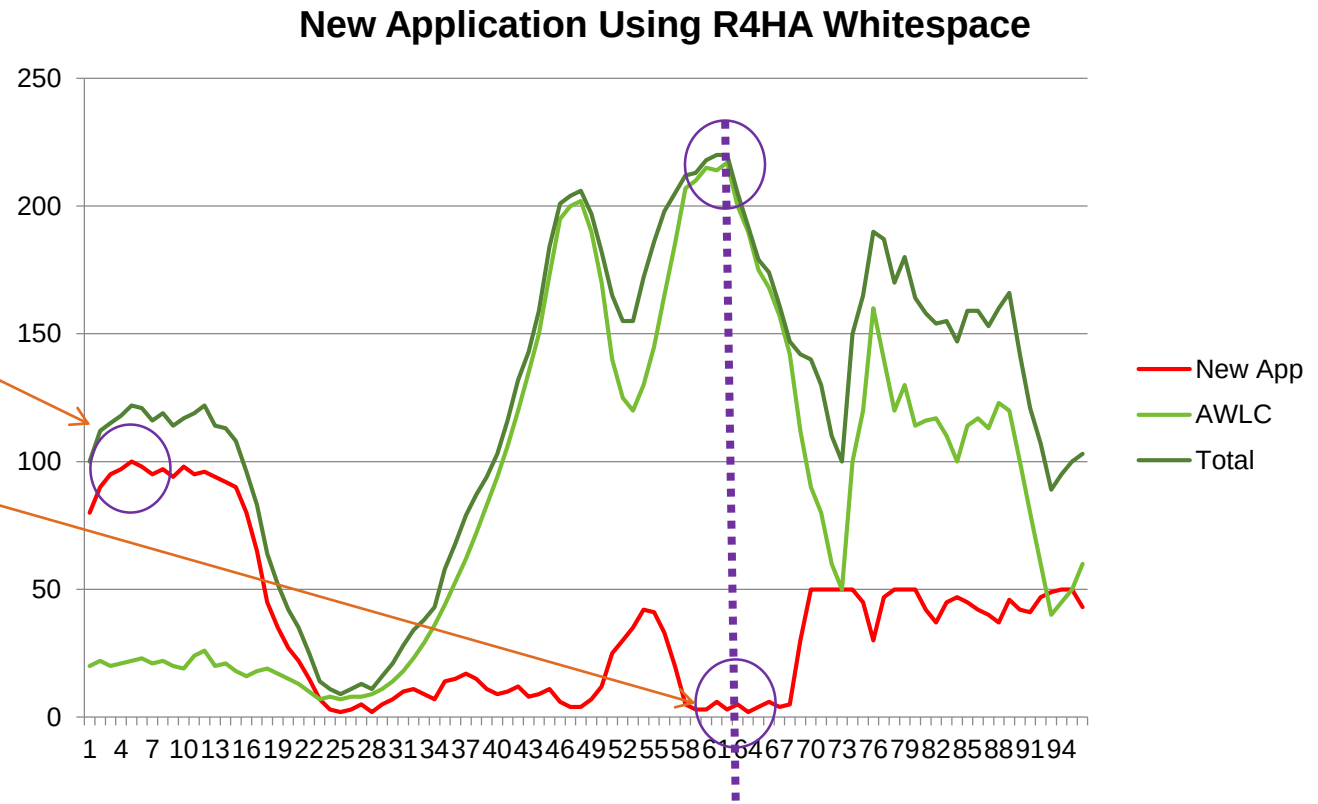
Container Pricing

- Traditional pricing may be best suited to applications that run outside the peak.

Peak MSUs for new application is 100 MSUs.

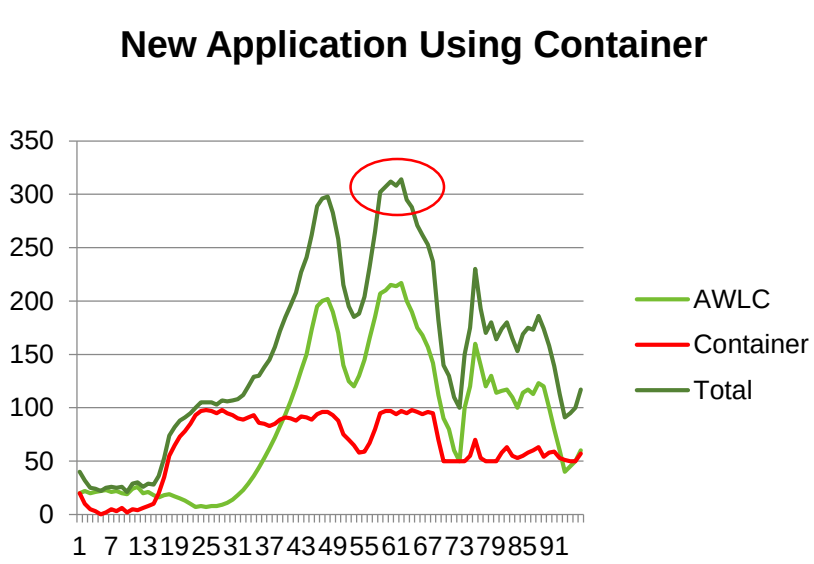
Contribution of new application to Peak R4HA is nearly nothing.

Running it in a container (with a 100 MSU peak) would presumably cost more than treating it the same as all your traditional work.



Container Pricing

- Container pricing *may* be best suited to applications that use a lot of capacity *in* the peak



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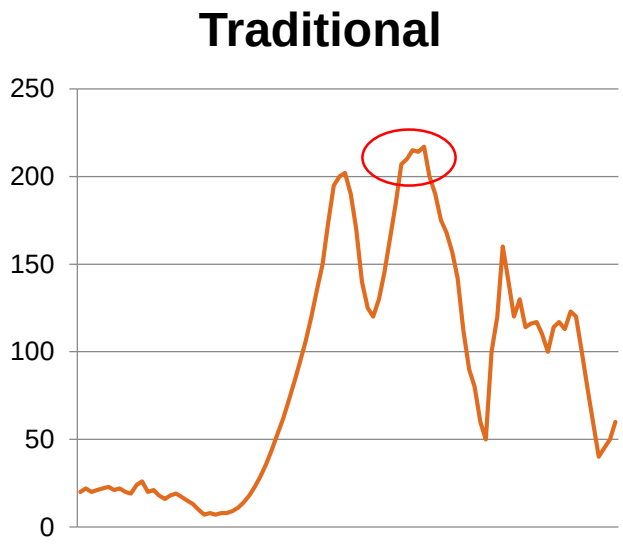
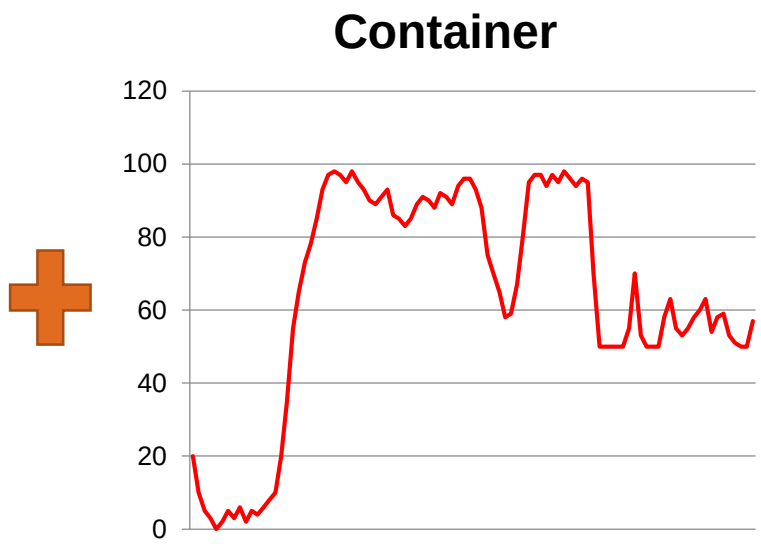


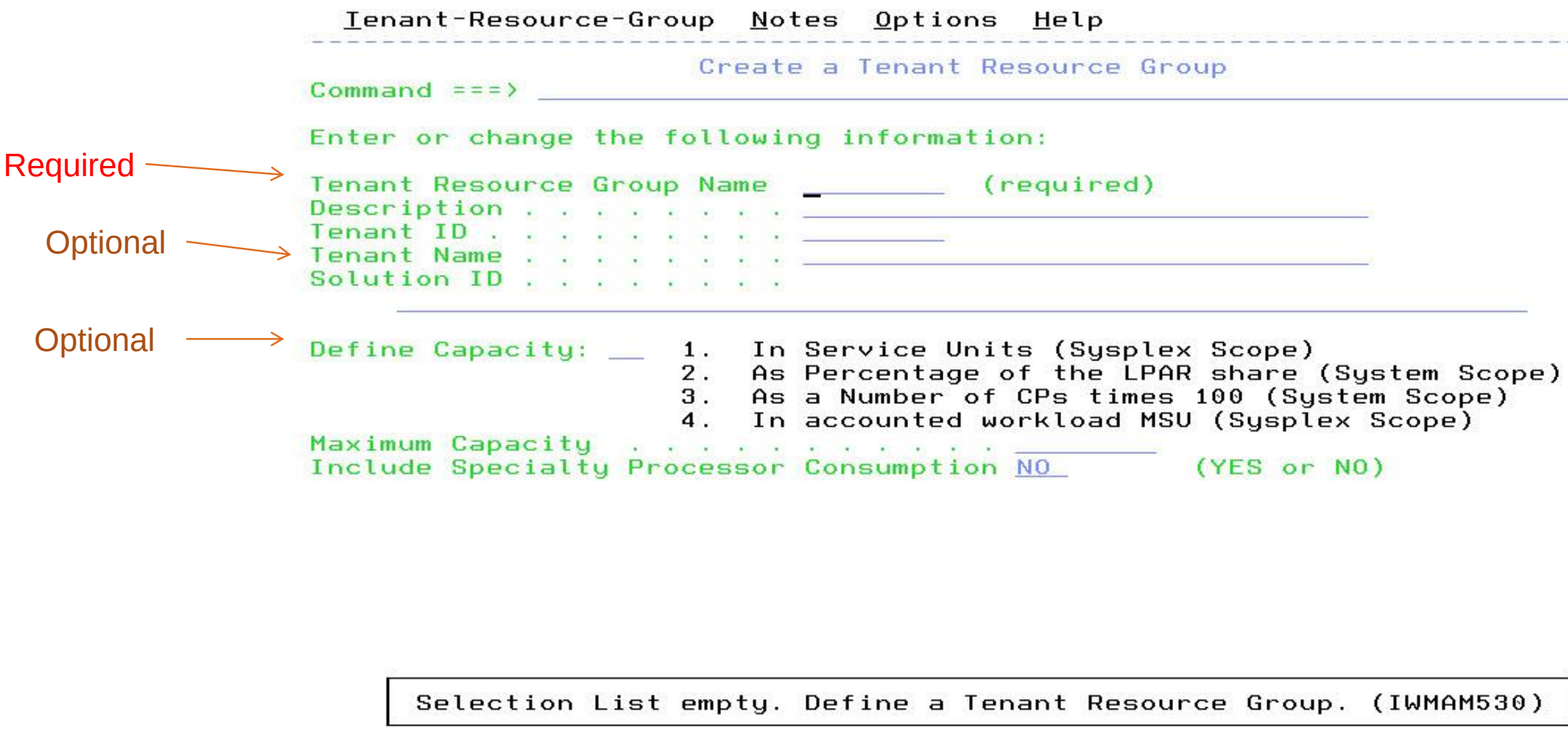


- If you treated it as traditional work, the peak R4HA for ALL work would be 310 MSUs.
- If you use Container Pricing for the new application, your Peak R4HA for everything else would be 210 MSUs, PLUS something (???) for the container?

Container Pricing

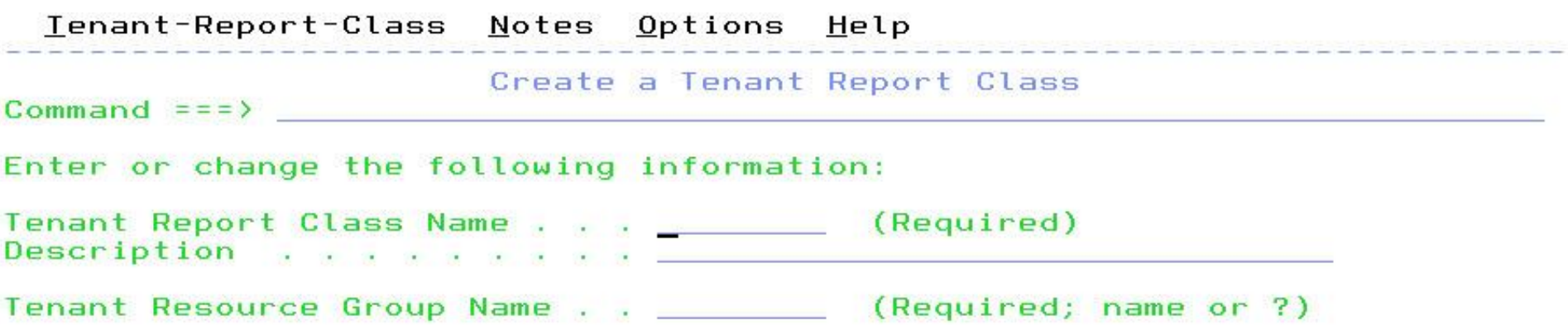
- How does it work?
  1. Decide which of the offerings you are interested in.
  2. Complete paperwork and send to IBM.
  3. If approved, logon to IBM License Management System to get the Solution ID.
  4. If using dedicated LPARs, skip to step 8.
  5. Create one or more Tenant Resource Group(s) (TRGs) and Tenant Report Classes (TRCs) in WLM and assign the TRCs to the appropriate TRG. *Solution ID must be specified when defining the TRG*. (IF you want to place the application in a dedicated LPAR, you can skip this and the next step)
  6. Use WLM classification rules to assign new workload to one or more Tenant Report Classes.
  7. Information about CPU consumption of TRG is included in SMF records and processed automatically by SCRT. Skip to step 9.
  8. Update SCRT Control statements to assign the Solution ID to the DevTest LPARs
  9. SCRT reports will reflect the net R4HA after the MSUs have been deducted.

Container Pricing



Selection List empty. Define a Tenant Resource Group. (IWMAM530)

Container Pricing



Selection List empty. Define a Tenant Report Class. (IWMAM380)

Container Pricing

- If your container is one or more dedicated LPARs, you do not need to do anything in WLM – no TRGs or TRCs.
- All that is required is that you include a statement like this in your SCRT parameters for each dedicated Container Pricing LPAR:
  - CONTAINER CPC=tttt-sssss,IMAGE_ID=imageId,ID=xxx --- xxx

- See https://public.dhe.ibm.com/common/ssi/ecm/zs/en/zsl03543usen/zsl03543-usen-00.pdf for a list of dummy Solution IDs that customers can use to test the process.

Container Pricing

- Tenant Resource Groups are based on WLM Resource Group concept.
- You can optionally specify caps at the TRG level, just as you can for traditional Resource Groups.
- There is also a new metric for Resource Group caps – MSUs.
- HOWEVER….. ALL of the resource group caps are based on *real time* usage, NOT on the R4HA.
  - Your container size is based on the R4HA MSUs of the container. So if you were to specify a TRG cap of 100 MSUs, it is unlikely that the container R4HA would ever actually reach 100 MSUs.
  - The new MSU Resource Group cap is conceptually similar to Absolute MSU caps.

Container Pricing

- SCRT Reports have been extended, with new sections containing information about each Solution.
- However, the objective is that it should be largely transparent unless you WANT to see the Container info.
  - You create your TRGs and TRCs and assign work in WLM once.
  - The Solution ID and usage information is captured by WLM and saved in the type 70 SMF records.
  - SCRT has been enhanced to retrieve all the information it needs from the type 70 and type 89 records.
    - Only exception is for dedicated LPARs, when you need to associate the LPAR with the SOLUTION ID in the SCRT control statements.

Container Pricing Prerequisites

- Only supported for workloads running on z13/z13s or z14.
- Requires z/OS 2.2 or z/OS 2.3.
  - But 2.1 is supported if all containers are dedicated LPARs.
- Requires Java SCRT V25.***2***
- PTFs to numerous products – monitor IBM FIXCAT IBM.Function.PricingInfrastructure to ensure you are aware of all required fixes.
- Must submit required paperwork to IBM (expected to be similar to that required for zCAP) and receive their approval.
- Each approved solution will have a unique Solution ID.

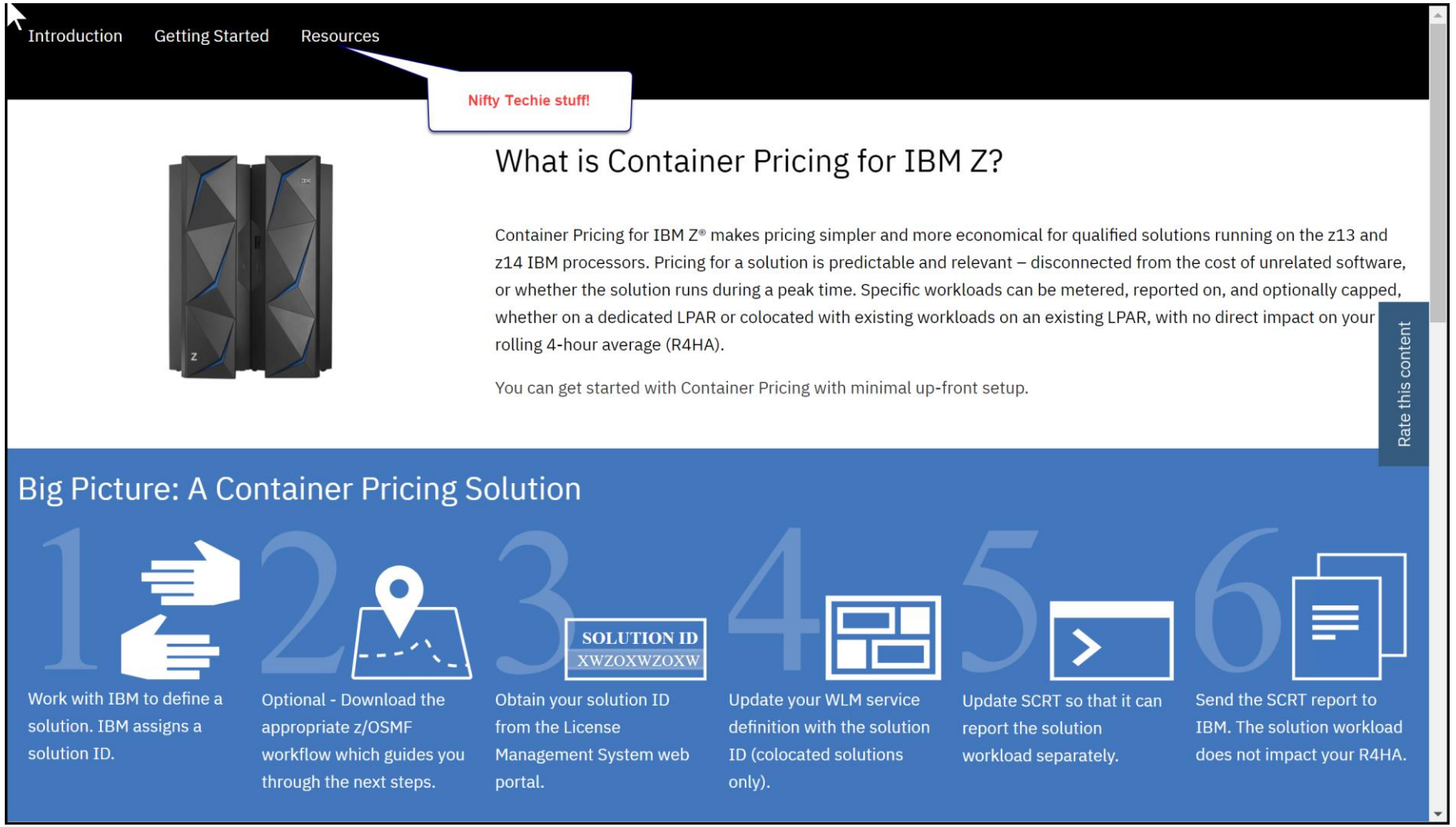
Container Pricing Considerations

- Just like most other IBM software price options, Container Pricing is intended to make it cheaper and easier to GROW your z/OS environment. While sites that are shrinking *might* benefit from it, that is *not* the target audience.
- The Test and Development offering is potentially the most interesting offering in the near term, especially for customers that already have separate test and development LPARs:
  - It is conceptually similar to existing Solution Edition offering, and customers that are using that offering seem very pleased with it.
  - Unlike Solution Edition, it does not *require* a separate LPAR for Test/Dev work. However, classifying all the Test/Dev work in a shared LPAR might be a non-trivial exercise.
    - A dedicated LPAR will not require any TRG definition – just some SCRT control statements.
- Customers need to discuss with their vendors how prices of non-IBM products would be impacted by Container Pricing.

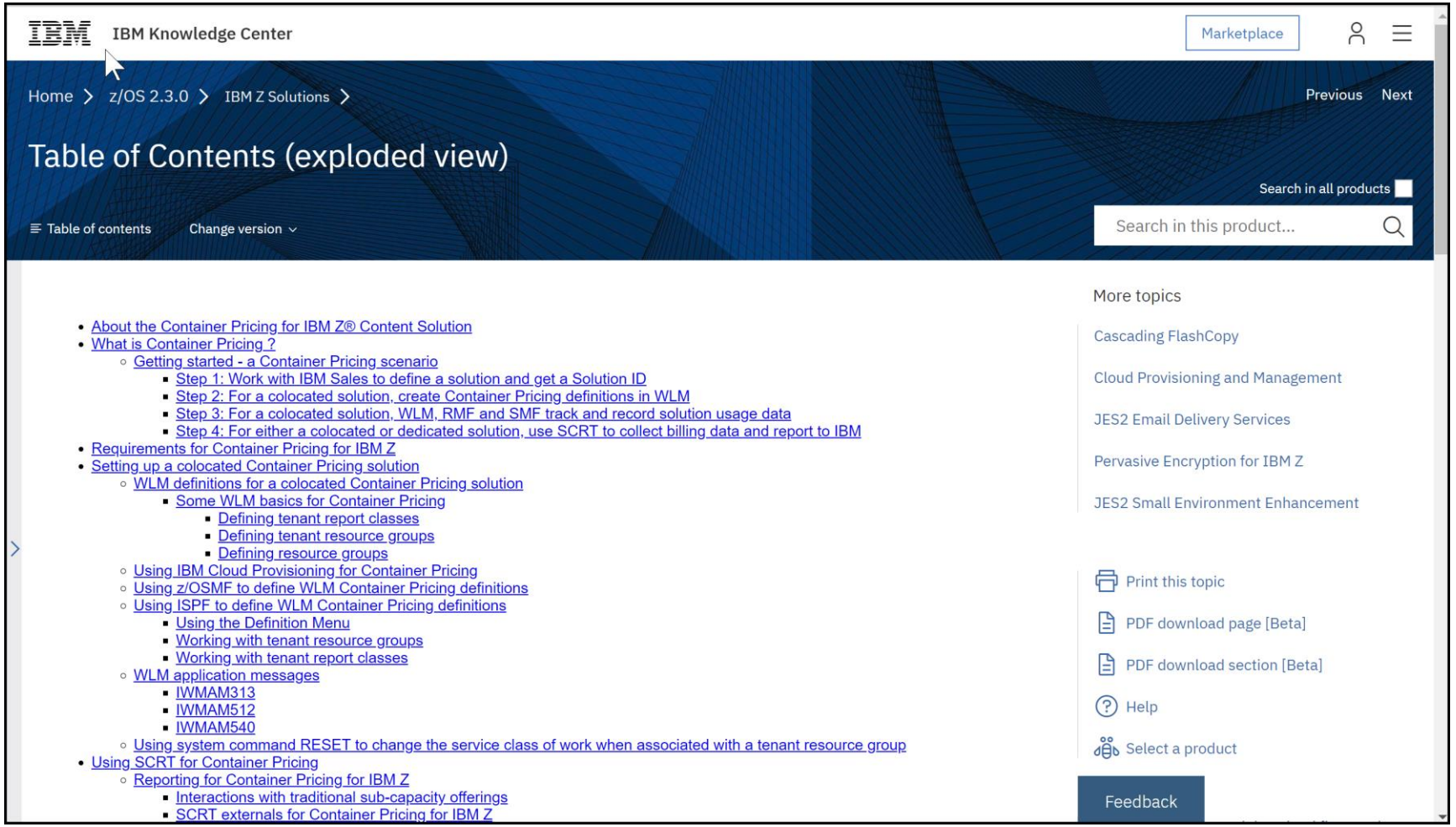
Container Pricing References

- z/OSMF Workflow to define a collocated container.
- z/OSMF Workflow to define a dedicated container.
- Container Pricing White Paper.
- WLM Paper on Container Pricing.
- All product manual references to Container Pricing here.
- Andrew Sica's latest SHARE Session 23523, Container Pricing Update.
- Container Pricing article in *Cheryl Watson's Tuning Letter 2018 No. 1* for subscribers.
- Content Solution – great view of resources: https://ibm.biz/BdYYgv
- Container Pricing for IBM Z Application Development and Test Solution Capacity Limits Considerations: https://ibm.biz/BdYYgK

Content Solution



All Product Manual References



Summary

- In general, we believe that the DevTest Container option is a very good thing for most companies, especially those that have dedicated LPARs for DevTest.
  - Be careful if you have a lot of IPLA products licensed at sub-capacity.
  - Even if you are shrinking, you should consider it.
    - The difference in cost between using DevTest container and not using it is probably trivial. But you get the benefit of having a predictable cost and being able to give more capacity to DevTest without impacting your total MLC bill.
- *Very* important to analyze your Production and DevTest LPARs for the last 12 months, to ensure that seasonal workload changes don't result in your setting an unnecessarily high Solution MSUs value, or blowing through the limit because you set it too low.
  - YOU control which 3 months are used as the base, so choose intelligently.
- This takes time – do NOT allow yourself to be rushed into it.

z End

- If you have any questions, suggestions, comments, or general abuse, please email us at technical@watsonwalker.com
- Don't forget our next sessions:
  - 23286 – Performance and Capacity Insights for Your Outsourced z/OS Mainframe with Brent Phillips (IntelliMagic) and Charles Hinkle (Edge Solutions & Consulting) tomorrow at 8:30 AM in room 104
  - 23515 – The Cheryl & Frank zRoadshow on Friday at 10 am in room 224.
- Thank you for coming, and please complete the online evaluation!