SHARE San Jose 2017

Mainframe Software Costs – Taming the Beast

Cheryl Watson, Watson & Walker
Frank Kyne, Watson & Walker
www.watsonwalker.com
technical@watsonwalker.com

Watson Walker

#SHAREsjc

SHARE is an independent volunteer-run information technology association that provides education, professional networking and industry influence.

SHARE
EDUCATE • NETWORK • INFLUENCE

Welcome

- Thank you for attending this session!
- Who we are and what we do:
  - Three-person company with consultants; started in 1987; Frank Kyne joined in 2014 from IBM's ITSO
  - Quarterly subscription-based newsletter - *Cheryl Watson's Tuning Letter* (since 1991) and *Cheryl Watson's System z CPU Chart*
  - Trainers, consultants, IBM Business Partner, software vendor (see us in Technology Exchange)
  - z/OS and SHARE evangelists, Subject Matter Experts in z/OS new features, WLM, performance, Parallel Sysplex, Workload Manager, software pricing, high availability, software asset management, outsourcing, and chargeback
- Other sessions this week:
  - EXECUforum – Tue, 11:30 – *Mainframe Performance and You*
  - Vendor Session – Tue, 1:45 – *A New Offering to Contain z/OS Software Costs*
  - Session 20524 – Fri, 10 am - *The Cheryl and Frank zRoadshow*

Are You Looking at New Technologies?

- Are your workloads growing?
- Are you looking at new applications to access your current z/OS databases? Can you implement them quickly?
- Consider the following slide from Scott Engleman, IBM z/OS Offering Manager, at session 19875 (SHARE Atlanta 2016) on *z/OS Trends and Directions*.

Emerging Technologies

SHARE
EDUCATE • NETWORK • INFLUENCE

Big Data

2.5 billion gigabytes of data generated every day

Analytics
Moving to real time

+7.6% in customer lifetime value for firms using engagement analytics

$226B – annual cost of health care fraud

Cloud

60% of banks process most transactions in cloud by 2016

Mobile

35% transaction growth driven through mobile annually through 2017

Intelligent / Connected Systems

7.9 million in U.S. adopted NFC e-Wallets

Collaboration

60 million US households conducting P2P payments

Security

$7 million is average cost of a security breach in the US

Complete your session evaluations online at SHARE.org/Evaluation

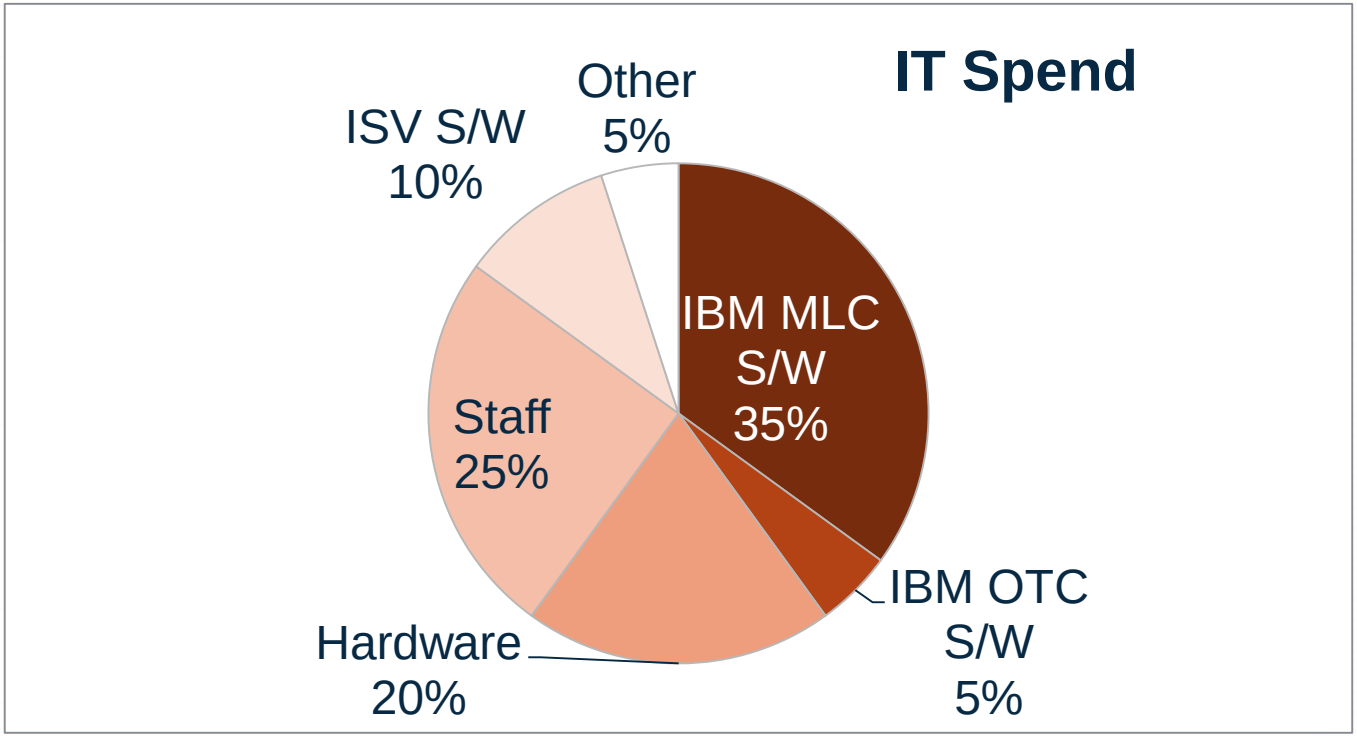
SHARE Atlanta 2016

The Software Price Dilemma

- IBM and other vendors are torn between protecting their mainframe revenue, and making the mainframe an attractive and affordable platform for growth and new applications in order to maintain profitability into the future.

- This results in multi-tier pricing mechanisms, with one price for traditional workloads, and different prices for targeted workloads.

Why You Are Here…



Software Pricing Basics

- IBM z/OS-based products are charged based on one of two basic models:
  - International Program License Agreement (IPLA) – One Time Charge (OTC) plus annual subscription and support charge (S&S).
  - Monthly License Charge (MLC).
- Each of these offer the following options (depending on the product):
  - Full Capacity (price is based on full machine capacity).
  - Sub-Capacity (price is based on usage in one or more LPARs).
  - Sub-Capacity MLC products tend to make up the bulk of your z/OS-related software bills, so we will focus on that category.

Software Pricing Basics

- How is usage measured for Sub-Capacity products?
  - Products are charged based on the consumption of the LPARs they run in, *not* on the CPU consumption of the individual product.
  - To provide flexibility and avoid customers being penalized for brief workload spikes, software bills are based on the peak Rolling 4-Hour Average (R4HA) CPU consumption of the LPARs a product runs in.
  - CPU consumption is expressed in units of ‘MSUs’ – what is an MSU?

Software Pricing Basics

- Based on IBM measurements using a variety of workloads ('LSPR', Large Systems Performance Reference), every IBM z Systems CPU is assigned an MSU value.
  - If a 100 MSU CPU is 100% busy for an entire interval, it is said to have used 100 MSUs in that interval.
  - If it was busy for 47% of the time, it would have used 47 MSUs.
- CPU utilization can be accurately measured using tools such as RMF or SMF.
- This provides two widely recognized and accepted metrics – the full capacity MSUs of the CPU, and its utilization.

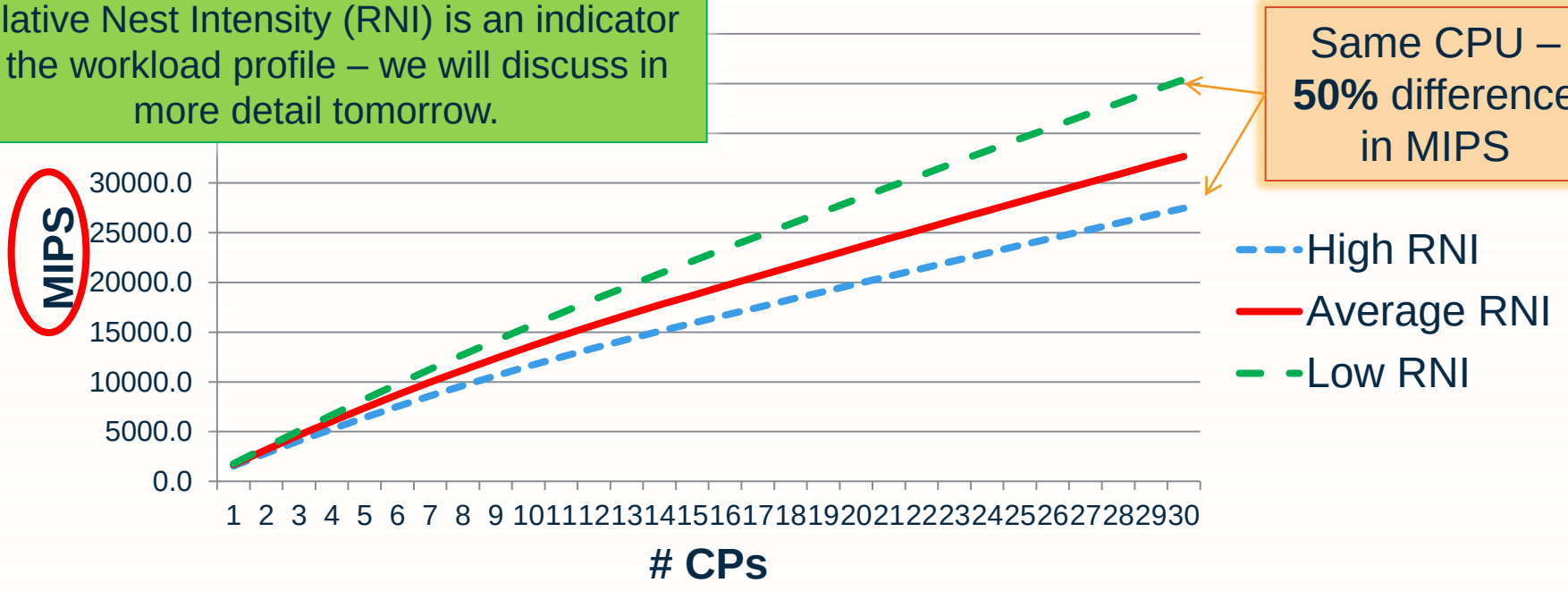
Software Pricing Basics

- Another well-known ‘metric’ is MIPS.
  - This stands for Millions of Instructions Per Second, and was originally a reasonably accurate indication of the speed of a CPU.
- As CPU design became increasingly complex, the elapsed time for one instruction can vary by a factor of up to 1000 from one time to another.
- As a result, IBM publishes 5 different MIPS values for each z Systems CPU, with the different numbers representing different workload profiles.
- It would not be practical to base software bills on a number as dynamic as the MIPS number, which can change from second to second.
- For this reason, we recommend that all software contracts should be based on MSUs rather than MIPS. *[Note: for modern processors, an MSU is equivalent to 8.0 to 8.3 MIPS.]*

Software Pricing Basics

Relationship Between RNI and MIPS for z13 7xx

Relative Nest Intensity (RNI) is an indicator of the workload profile – we will discuss in more detail tomorrow.

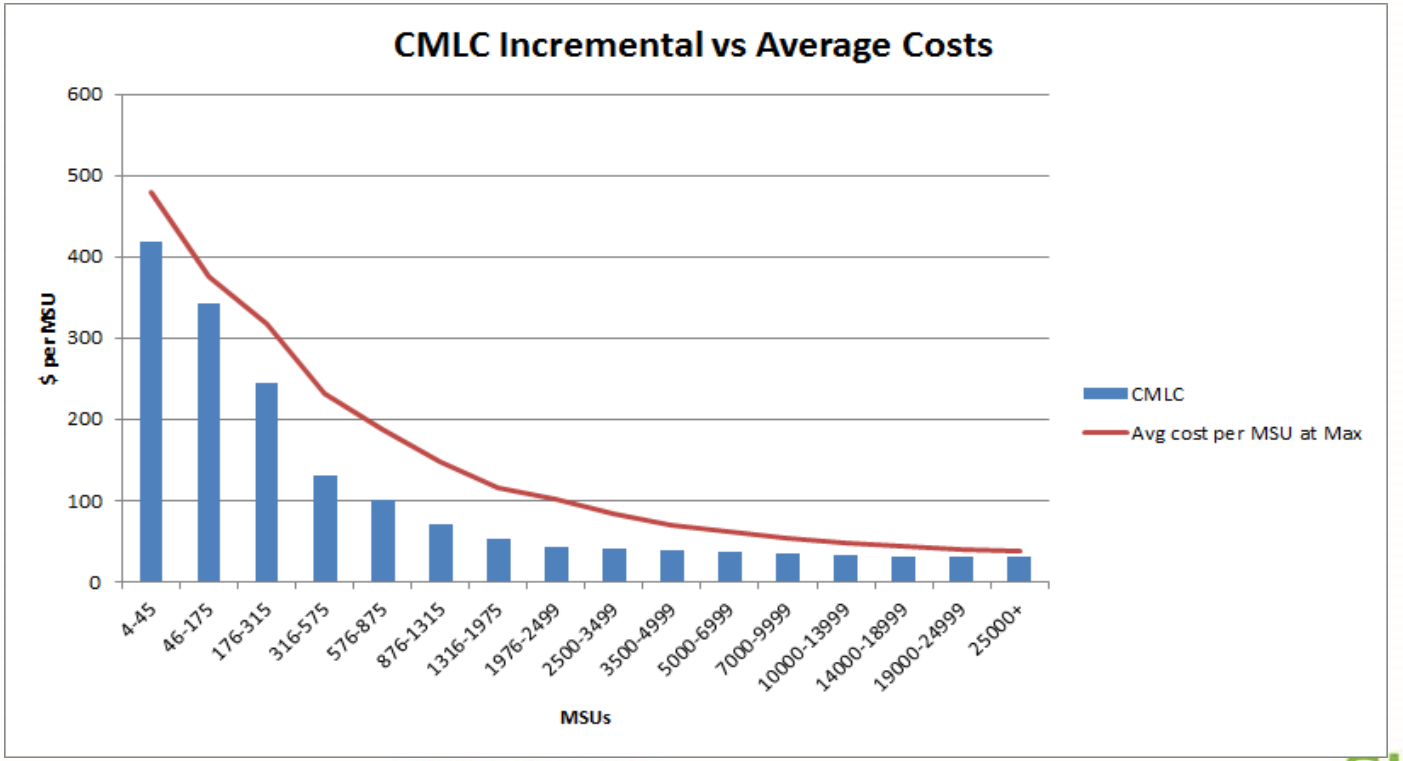


Same CPU – **50%** difference in MIPS

Understanding z/OS SW Pricing

- The software ‘pricing curve’ is like a bulk discount – when you consume more MSUs, the cost of additional ones gets lower.
  - This means that the cost of *incremental* capacity is less than your current average cost, and has the effect of *reducing* your average.
  - The savings from reducing your capacity are also less than the average, and has the effect of increasing your average cost per MSU.
    - As a result, downsizing customers find that the cost per transaction for remaining transactions gets higher every time a workload is moved off z/OS.
    - It is also common that savings are less than expected when workloads are moved off z/OS.

IBM Sub-Cap Pricing



IBM Sub-Cap Pricing

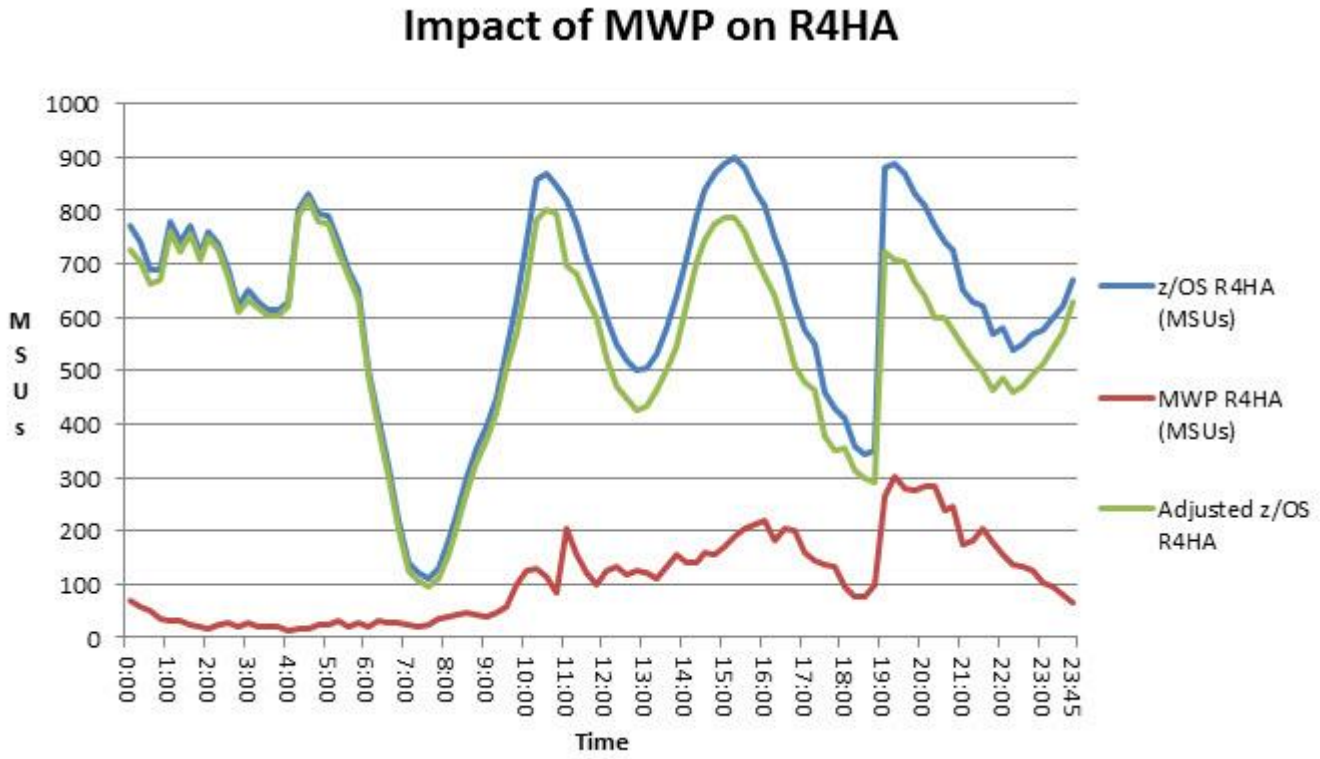
- Example: z/OS Pricing

z/OS V2 5650-ZOS - Entitlement S01728T (Base); z/OS V1 5694-A01		
Adv. Workload License Charge	**Price (USD)**	
Base price (Included: 3 MSU)	$4,281.73	
Cumulative Unit Price for 4 to 45 MSU	$401.86	$21,159.85
Cumulative Unit Price for 46 to 175 MSU	$328.69	$63,889.55
Cumulative Unit Price for 176 to 315 MSU	$235.87	$96,911.35
Cumulative Unit Price for 316 to 575 MSU	$125.58	$129,562.15
Cumulative Unit Price for 576 to 875 MSU	$96.10	$158,392.15
Cumulative Unit Price for 876 to 1315 MSU	$67.70	$188,180.15
Cumulative Unit Price for 1316 to 1975 MSU	$51.32	$222,051.35
Cumulative Unit Price for 1976 and more MSU	$41.50	

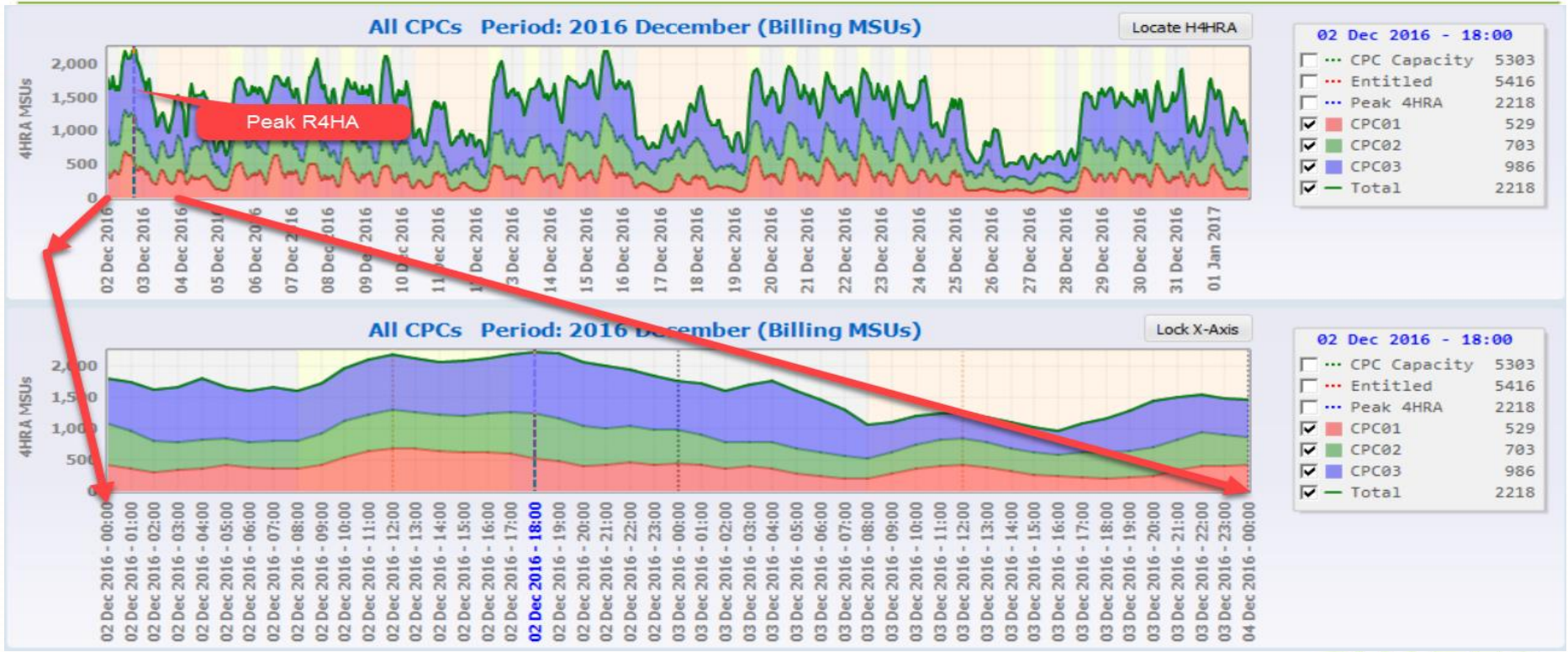
Software Pricing Options

- In addition to ‘bulk discounts’, IBM also offer multiple (>20!) pricing options, designed to incent customers to implement particular types of workload on z/OS:
  - Mobile – R4HA for every interval is reduced by 60% of the MSUs used by mobile txns.
  - Cloud – R4HA for every interval is reduced by 60% of the MSUs used by cloud txns.
  - ‘New’ applications
    - With zCAP, you only pay for MSUs for products used by new workload, 50% of those MSUs for z/OS, and nothing extra for other products in that LPAR.
    - With zNALC or MzNALC, you pay significantly less for z/OS, and have the option to get a reduced cost IPLA license for subsystems.
  - SAP, DevOps, WebSphere – ‘Solution Edition’ option.
  - Country MultiPlex Pricing – Calculates peak R4HA across all CPUs, rather than peak R4HA for *each* CPU.

Impact of Mobile Pricing on R4HA

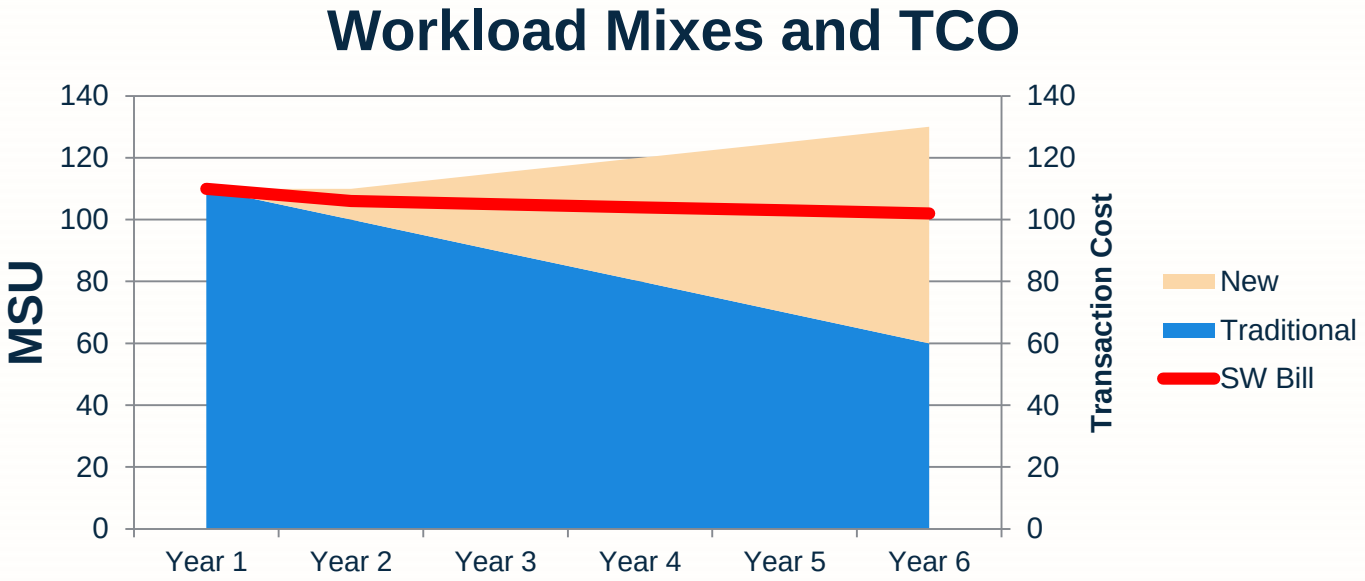


Tracking R4HA



Software Pricing Options

- As the traditional share of your total workload transitions to new applications, and new applications are added, the overall software bill *de*creases even though the total used capacity *in*creases.



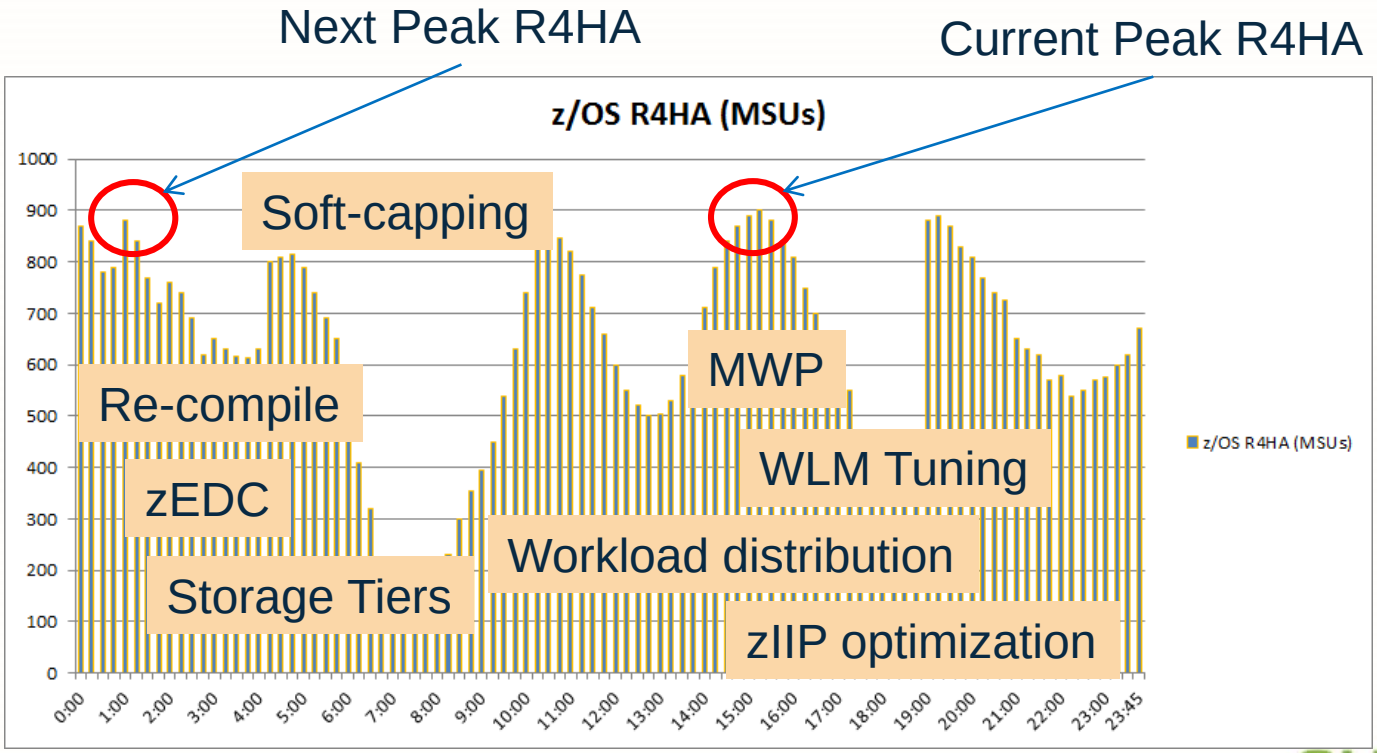
Optimizing Your Peak R4HA

- Optimizing your R4HA is like playing whack-a-mole – every time you successfully reduce your peak R4HA, a *new* interval becomes your peak.
- The strategy to address a given peak depends on what is driving that peak. For example:
  - If mobile-generated transactions are a significant part of the workload at your peak R4HA, the appropriate tool might be to sign up for Mobile Workload Pricing.
  - If there is a large amount of data set compression/decompression activity during your peak R4HA, the appropriate tool might be to deploy zEDC.

Optimizing Your Peak R4HA

- More examples:
  - If HSM migration consumes a large amount of CPU, storage tiers might be the right answer.
  - If DB2 is the largest subsystem during the R4HA, then adding memory and exploiting it with DB2 11 or 12 might be the right answer.
- Tuning your R4HA is a never-ending process, and success depends on using the full combination of software pricing options and technology for each new scenario.

Optimizing Your Peak R4HA



Optimizing Your Peak R4HA

- Don’t forget that your software bill is multi-dimensional:
  - Your mainframe SW bill is the sum of the bills for the software products you use.
  - Charging for Sub-capacity products is based on the sum of the LPARs those products are used in.
  - The R4HA for each LPAR that product ran in (in that interval) is summed for each CPC or each Country Multiplex.
- Because each LPAR could run a different subset of your products, different products are likely to have a different peak R4HA. So you might have to address different peaks for different products – in which case, concentrate on the most expensive products first.

Optimizing Your Peak R4HA

==N5==========							
DETAIL LPAR DATA SECTION							
	Highest	Hour Count	Date/Time	2nd Highest	Hour Count	Date/Time	
LP101	21	4	02 Dec 2016 - 12:00	20	3	02 Dec 2016 - 11:00	
LP102	165	1	06 Dec 2016 - 02:00	161	1	03 Dec 2016 - 01:00	
LP103	578	1	02 Dec 2016 - 12:00	567	1	02 Dec 2016 - 13:00	
LP109	8	4	02 Dec 2016 - 12:00	7	29	02 Dec 2016 - 11:00	
CPC	681	1	02 Dec 2016 - 12:00	672	1	02 Dec 2016 - 13:00	
==P5==========							
PRODUCT MAX CONTRIBUTORS							
				PRODGRP	PRODGRP	PRODGRP	PRODGRP
Product Name	Product ID	Highest	Date/Time	LP101	LP102	LP103	LP109
z/OS V2	5650-ZOS	681	02 Dec 2016 - 12:00	21	74	578	8
DB2 11 for z/OS	5615-DB2	652	02 Dec 2016 - 12:00	0	74	578	0
CICS TS for z/OS V5	5655-Y04	652	02 Dec 2016 - 12:00	0	74	578	0
IBM MQ for z/OS V8	5655-W97	652	02 Dec 2016 - 12:00	0	74	578	0
Tivoli NetView for z/OS V6	5697-NV6	681	02 Dec 2016 - 12:00	21	74	578	8
Tivoli Workload Scheduler for z/OS V9	5698-T08	681	02 Dec 2016 - 12:00	21	74	578	8
IBM Enterprise Cobol for z/OS V4	5655-S71	173	03 Dec 2016 - 01:00	12	161	0	0
IBM Tivoli System Automation for OS/390 V3	5698-SA3	681	02 Dec 2016 - 12:00	21	74	578	8
IBM Sterling Connect: Direct for z/OS V5	5655-X01	578	02 Dec 2016 - 12:00	0	0	578	0

Optimizing Your Peak R4HA

Month Dec 2016					CPC01	CPC02	CPC03	Totals	MLC Disc%	CMP Adjust	MLC Total	MLC Perc
MLC Products	Product ID	Lic Type	Lic Ref	In SCRT	MSUs	MSUs	MSUs	MSUs	8.4%	$ 5,090.40	$ 762,810.15	100.0%
z/OS V2 (Traditional)	5650-ZOS	CMLC	LPAR	Yes	529	703	986	2218	8.4%	$ 6,239.99	$ 227,378.64	29.8%
z/OS V2 DFSMS dsshsm	5650-ZOS	CMLC	z/OS	No	529	703	986	2218	8.4%	$ 596.78	$ 20,210.56	2.6%
z/OS V2 DFSMS rmm	5650-ZOS	CMLC	z/OS	No	529	703	986	2218	8.4%		$ 9,579.59	1.3%
z/OS V2 DFSORT	5650-ZOS	CMLC	z/OS	No	529	703	986	2218	8.4%	$ 106.62	$ 3,164.51	0.4%
z/OS V2 SDSF	5650-ZOS	CMLC	z/OS	No	529	703	986	2218	8.4%	$ 204.68	$ 5,903.40	0.8%
z/OS V2 C/C++ without Debug	5650-ZOS	CMLC	z/OS	No	529			529	8.4%	$ 95.44	$ 5,686.88	0.7%
z/OS V2 Infoprint Server	5650-ZOS	CMLC	z/OS	No		703		703	8.4%	$ 219.12	$ 5,145.56	0.7%
non-z/OS (CMLC)												0.0%
CICS TS for z/OS V5	5655-Y04	CMLC	LPAR	Yes	507	703	986	2196	8.4%	$ 9,033.09	$ 195,855.47	25.7%
DB2 11 for z/OS	5615-DB2	CMLC	LPAR	Yes	507	703	986	2196	8.4%	$ -14,374.70	$ 150,100.87	19.7%
IBM MQ for z/OS V8	5655-W97	CMLC	LPAR	Yes	604	631	753	1988	8.4%	$ 2,163.96	$ 81,119.42	10.6%
Tivoli NetView for z/OS V6	5697-NV6	CMLC	LPAR	No89	529	703	986	2218	8.4%	$ 589.96	$ 11,314.31	1.5%
IBM Enterprise Cobol for z/OS V4	5655-S71	CMLC	LPAR	No89	173			173	8.4%	$ 215.46	$ 5,576.85	0.7%

Technology Update Pricing

- Technology Update Pricing for z13 (TU3)
  - *Additional* discount if z13 server priced with AWLC is run stand-alone OR in a parallel sysplex with other z13s which are priced with AWLC, then monthly AWLC/AEWLC/CMLC is reduced by the following:

Total MSUs	Reduction in AWLC
4 – 45 MSUs	4.0%
46 – 315 MSUs	8.0%
316 – 1315 MSUs	9.0%
1316 – 2676 MSUs	10.0%
2677 – 5476 MSUs	12.0%
5477 – more MSUs	14.0%

Check Your Bills!

- How do you verify the accuracy of your vendors' software bills?
- Considering the large amounts of money involved, it is amazing how few installations check that their bills are accurate.
  - As we have seen, software pricing options are very complex.
  - Your z/OS system is a constantly-changing environment. Have all changes to your environment (add new SW, remove old SW, CPU upgrades, DR tests, contract changes, SVC, etc) been accurately reflected in your bill?
  - This frequently results in bills that are not what you would expect them to be. The error might be in your favor or the vendors favor – but if you don't calculate your bill yourself, how will you know if the bill you receive is accurate?

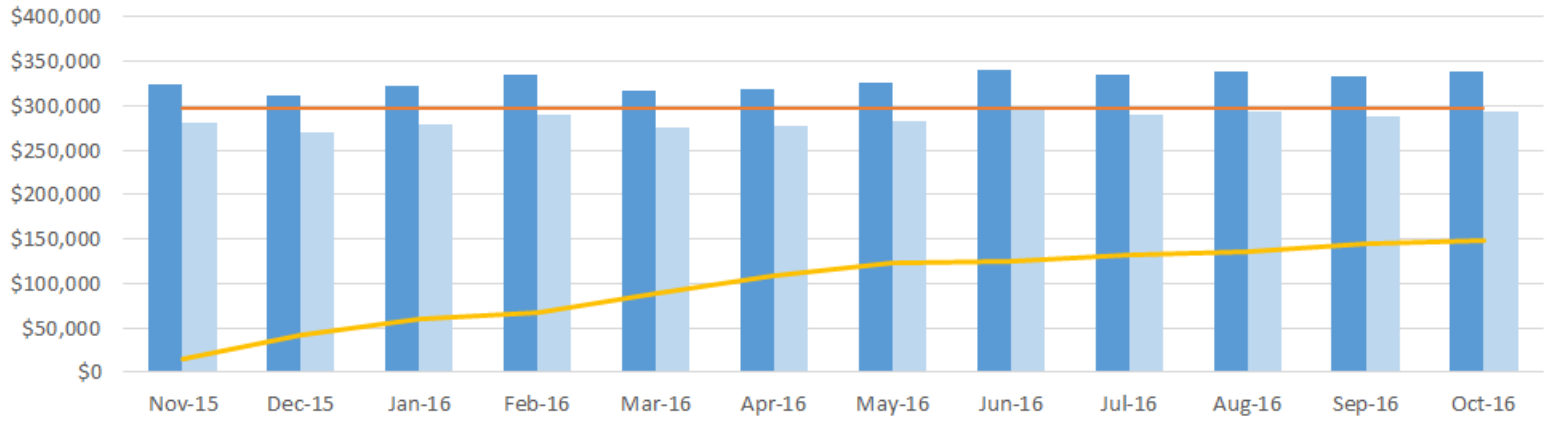
ELAs

- Many z Systems installations negotiate a multi-year contract with IBM.
  - There are various ‘flavors’, depending on what they cover, but generically they are called Enterprise License Agreements (ELAs).
- ELAs can be attractive because they offer predictable payments over the term of the agreement.
- They also typically offer some level of discount in addition to any other discounts you might be using.
- The starting point for ELA negotiations is what you would have paid if you didn’t have the ELA.
- Many customers say ‘it isn’t worth doing anything to reduce our SW bills because we are in an ELA’.

ELAs

- This is SO WRONG!
  - The base for your NEXT ELA discussions will be what you *would have* paid, so anything you can do NOW to reduce your basic bill will set a lower starting point for your next ELA negotiations.
  - Some of the actions to reduce your SW bills can take months to implement, so the time to start on them is NOW, *not* just before your current ELA expires.
  - Also, reducing costs now prepares you for a better Country Multiplex agreement.

Tracking ELA Costs



	Nov-15	Dec-15	Jan-16	Feb-16	Mar-16	Apr-16	May-16	Jun-16	Jul-16	Aug-16	Sep-16	Oct-16
Undiscounted	$324,778	$310,941	$322,690	$334,847	$317,014	$318,794	$325,489	$341,099	$334,446	$337,783	$332,110	$339,127
Discount	$281,550	$269,554	$279,740	$290,279	$274,820	$276,363	$282,167	$295,699	$289,931	$292,824	$287,906	$293,989
Billed	$296,914	$296,914	$296,914	$296,914	$296,914	$296,914	$296,914	$296,914	$296,914	$296,914	$296,914	$296,914
Accum	$15,364	$42,723	$59,896	$66,531	$88,625	$109,176	$123,923	$125,137	$132,120	$136,209	$145,217	$148,142

Complete your session evaluations online at SHARE.org/Evaluation

Outsourced Sites

- Outsourcing 101 – the price of your outsourcing contract is:
  - Outsourcer's costs + uplift (profit)
- So, anything that you and your provider can do to reduce their software bill should result in smaller bills for you (and a higher profit margin for them).
- This almost NEVER happens…
  - Depending on the terms of your agreement, actions that you take now to reduce your base bill will create a credit that you can use for other SW, HW, or possibly services purchases.
  - Most SW cost reduction projects require cooperation between the customer and the vendor. Who pays, and how much labor each party contributes, can be a major bone of contention.
  - The teams that create the outsourcing contracts typically do not have the technical and SAM expertise to structure the contract to encourage SW cost reduction projects.

Outsourced Sites

- And more…
  - Many vendors are focused on the profit *amount* rather than the profit *margin*, so are not inclined to do anything to reduce that.
  - The outsourcee is not incented to participate in a cost reduction project if they are not going to get a share of the savings.
  - No one has responsibility to identify opportunities for cost reduction – vendor views it as not being in their interest (who will do *extra* work to *reduce* their revenue?), and customers often no longer have in-house skills to do this.
- The net – the outsourcing agreement must be structured to support cost-reduction projects and spell out how savings will be divided between the parties.

What Runs Where

- Remember that many of your products are charged for on the basis of which LPARs they run in.
- Do you NEED to run every product in every LPAR?
  - For example, is it necessary for a compiler to be used in a (large!) production LPAR? Should that even be allowed, from a security/audit perspective?
- Chargeable z/OS features, such as RACF, are charged for in every LPAR that z/OS runs in, regardless of whether you use the feature in that LPAR. If you use a competitive product in a subset of LPARs, you are paying twice for that function in those LPARs.

What Runs Where

- There are often multiple pricing options that can be applied to the same scenario – zCAP, MzNALC, and Solution Edition, for example.
  - Need to look at the obvious cost of each one.
  - Also need to be aware of the ‘gotchas’.

It's a New World

- Traditionally, 'techies' were responsible for availability, capacity planning, and performance, while the Software Asset Management (SAM) and Procurement teams were responsible for negotiating contracts.
- There was little overlap between the two sides, so little need or justification to work together on a daily basis.
  - Do sysprogs tell SAM team about LPAR changes?
  - Does SAM staff tell sysprog about dates that are critical to pricing?
  - Do sysprogs tell SAM team about D/R changes?

It's a New World

- More examples of needed communication:
  - Does SAM team keep track of usage of IPLA products? Does any one?
  - Do capacity planners tell SAM team about expected growth?
  - Do sysprogs tell SAM team when a system goes down and has to be IPLed on another system?
  - Do sysprogs tell SAM team when a system bug causes a spike in usage?
  - Do sysprogs use capping? Should they? Is SAM team aware of caps?

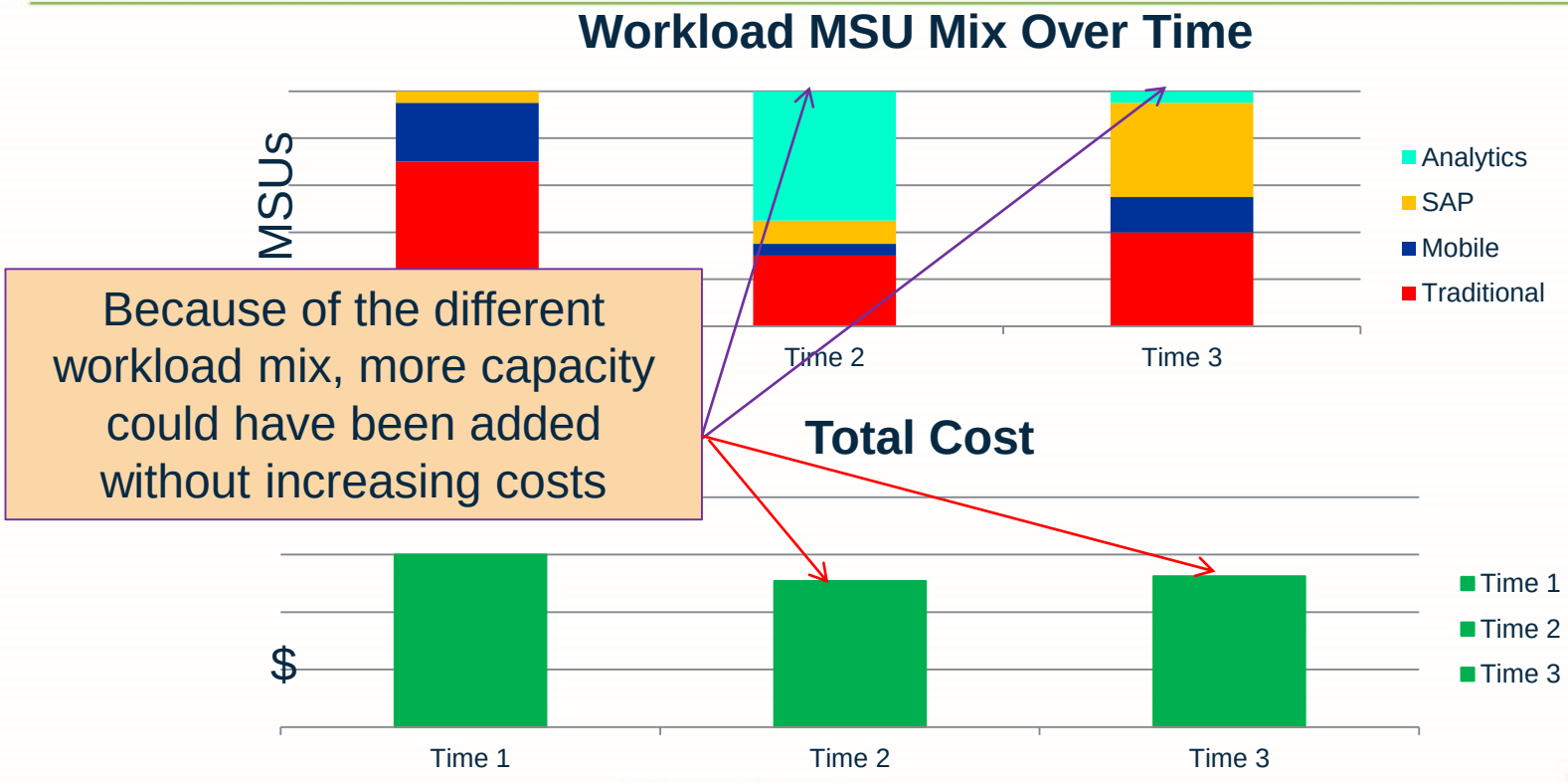
It’s a New World

- Three of IBM’s last four new pricing options (MWP, zCAP, zWPC) offer discounts for specific subsets of your workload.
  - Who is responsible to stay informed of the new options?
  - Who knows if you have, or will have, enough of that type of workload to justify opting for a particular offering?
  - Does your subsystem topology allow you to optimize the discounts?

It’s a New World

- IBM’s newest pricing options.
  - Does your application design enable easy and efficient identification and classification of workloads to meet IBM’s contractual requirements?
  - Do your capacity and performance tools factor in the effect of the pricing options you have selected?

It's a New World



It’s a New World

- These are just some examples of the importance and potential benefits of a much closer working relationship between:
  - Subsystem programmers
  - Application architects and developers
  - Software Asset Management team
  - Procurement team
  - Capacity managers and performance analysts

Software Audits

- As the IT landscape becomes more complex, and all corporations are under extreme pressure to maximize short term profits, we are seeing a marked increase in the number, duration, and intensiveness of software audits, and the size of the penalties that are paid in case of a failed audit.
- The best defense against an audit is to show that you are completely on top of everything:
  - All contracts should be immediately accessible.
  - Use and retain the output from products such as TADz (IBM) or P-Tracker (UBS-Hainer) that monitor and record which products were used in which LPARs.
  - Keep *at least* 1 year's SMF Type 70 and 89 records.

Software Audits

- When negotiating contracts, try to get vendor to agree to use SCRT reports instead of “MIPS”, because there is no way to measure MIPS.
- See our article in Enterprise Executive on ISV software audits - http://ourdigitalmags.com/display_article.php?id=2556373&view=328563

Sub-Capacity Reporting Tool

- IBM provide a tool called the Sub-Capacity Reporting Tool (SCRT) that collects information from your system and creates a file to be sent to IBM that will be used to create your software bills.
- For customers that use Mobile Workload Pricing or z Systems Collocated Application pricing, SCRT was temporarily supplemented by another tool called MWRT.
- MWRT was subsequently replaced by a new Java-based version of SCRT.
  - This is a significant enhancement to the original SCRT tool and MWRT.
  - We highly recommend that all z/OS customers migrate to the latest SCRT tool.

Other Tools

- There are a small number of products in the market that you can use to understand the constituent parts of your bill, and to model the impact of configuration changes.
- Just remember that if you decide to use any tool that it should do more than help you understand what you are doing today – it should be proposing alternatives (both technical and pricing) that can help you improve your TCO.

Summary

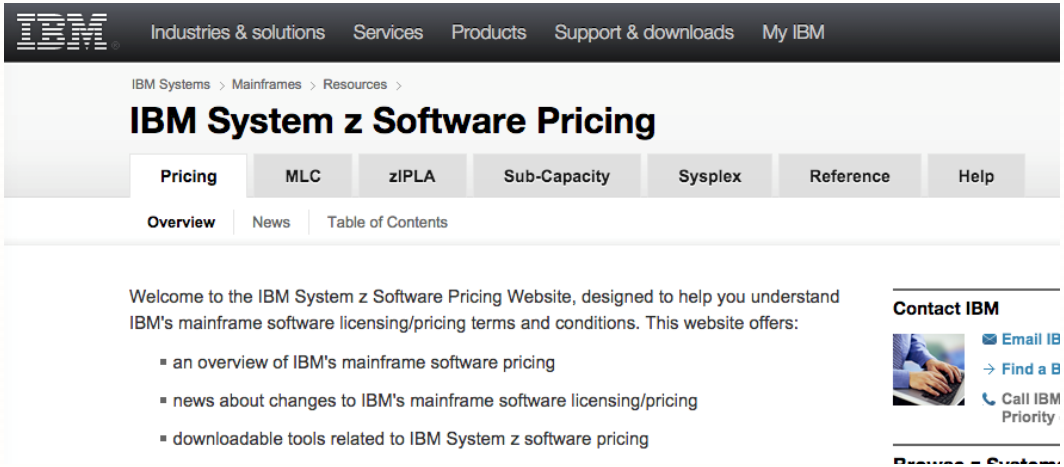
- Focus on where your costs are.
- Use the right tool for the job.
- Cost avoidance is just as important as cost control – expect and be prepared for an audit.
- Software pricing is horrendously complex and ever-changing. Using external expertise should be viewed in the same vein as bringing in specialized legal or financial skills.

Summary

- We have focused on IBM MLC software, but look at your bills and focus on the highest cost component of your bills.
- If possible, get ISVs to agree to sub-capacity licenses based on MSUs.
- Don’t let the quest for cost efficiencies impact performance or availability – their costs are less tangible, but likely far higher.
- Approach cost control in a holistic manner – decisions should factor in MLC, IPLA, ISV, Hardware (CPU MIPS, CPU memory, disk, and tape) and maintenance. Real savings are best achieved by including all of these in your decisions.
- Software cost containment is *at least* as relevant for outsourced companies as it is for those with their own data centers.

References

- Primary Website –
  http://www-03.ibm.com/systems/z/resources/swprice/index.html



References

- The Frank and Cheryl zRoadshow – Part 1 (SHARE in Atlanta, August)
- Controlling MLC Costs for Mobile Workloads (SHARE in Atlanta, August)
- The Cheryl and Frank zRoadshow Part 2 (SHARE in Atlanta, August)
- The Cheryl and Frank zRoadshow (SHARE in San Antonio, March)
- Controlling MLC Costs for New Workloads (SHARE in San Antonio, March)
- The Cheryl and Frank zRoadshow (SHARE in Orlando, August)
- A Consultant's View on New z/OS Pricing Options (SHARE in Orlando, August)
- The Cheryl and Frank zRoadshow (SHARE in Seattle, March)

SHARE
EDUCATE • NETWORK • INFLUENCE

Thank You for Attending!
Please remember to complete your evaluation of this session in the SHARE mobile app.

Mainframe Software Costs – Taming the Beast

Complete your session evaluations online at SHARE.org/Evaluation

SHARE San Jose 2017