MLC
I'm paying HOW MUCH for Db2?

Phil Grainger

BMC Software

November 2019

Session IF

Agenda

- What is Measured Workload Pricing?

- What does it mean to Db2?

- What can you do about it?

- How to "tune" your software bill

- UPDATE: Tailored Fit Pricing. New from IBM

- Summary

Terminology

License

- To legally execute software, you must have a LICENSE for the machine
- The license will also stipulate the pricing metric

MSU

- Millions of Service Units
- Measure of how much processing that can be done in an hour
- IBM publishes MSU ratings for all hardware

Service Unit

- Simply a measure of power
- "Bag of crisps" or "Box of biscuits"

Rolling 4 Hour Average

- MSU consumption averaged over a rolling four hour period

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Basics of IBM Software Monthly Licensing Charges

AWLC (Advance Workload Licensing Charges):
zEnterprise, EC12

- WLC (z10, z9, 990)
  - Includes the following
    - z/OS (OS, JES, RMF)
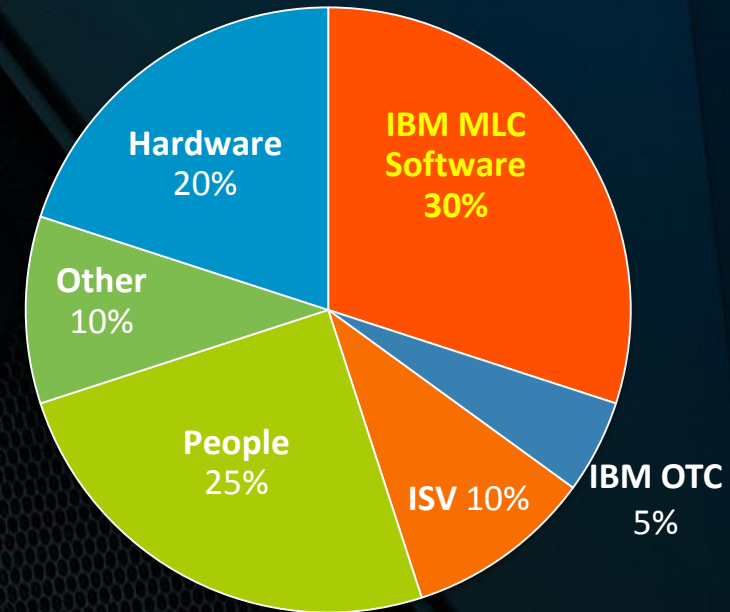   - CICS
    - Db2
    - IMS
    - Websphere MQ

Full-Capacity AWLC: charges are based on the full capacity where each AWLC product executes

Sub-Capacity AWLC: charges are based on the utilization of the LPAR or LPARs where an AWLC product executes
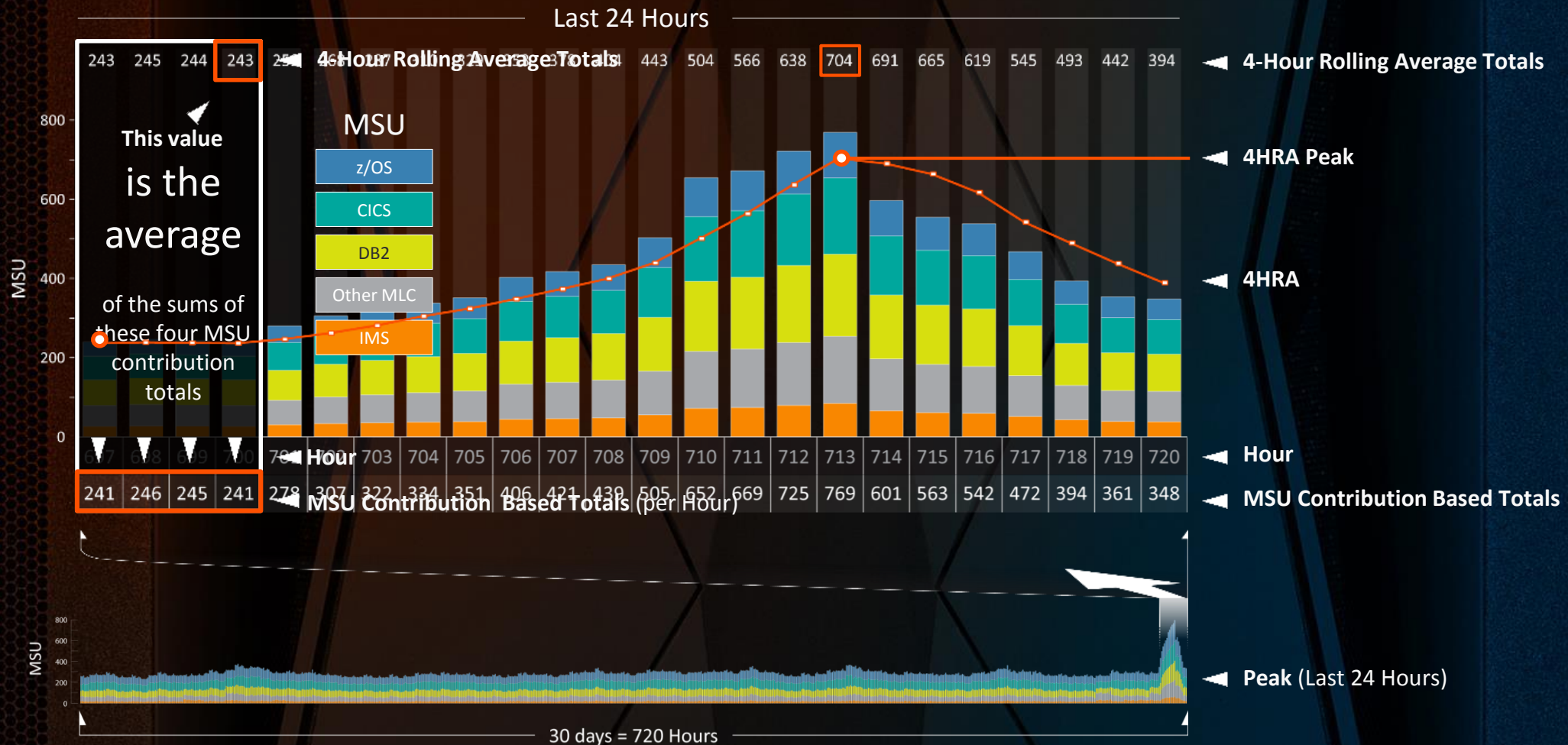
- **Charges determined by the monthly peak 4 hour rolling average**
- **ALL cpu consumption counts towards this average**
- Notice, it is NOT based on individual software usage

**Also see A22-7999-04**

- "Planning for Subcapacity Pricing"

Pie chart:
- IBM MLC Software 30%
- Hardware 20%
- Other 10%
- People 25%
- ISV 10%
- IBM OTC 5%

Understanding the 4-Hour Rolling Average

Last 24 Hours

4-Hour Rolling Average Totals

| 243 | 245 | 244 | 243 | 25 | 46 | 47 | 4 | 443 | 504 | 566 | 638 | 704 | 691 | 665 | 619 | 545 | 493 | 442 | 394 |

◄ **4-Hour Rolling Average Totals**

This value

is the

average

of the sums of these four MSU contribution totals

| 67 | 68 | 69 | 00 |

| 241 | 246 | 245 | 241 |

◄ **4HRA Peak**

◄ **4HRA**

MSU
- z/OS
- CICS
- DB2
- Other MLC
- IMS

MSU

800
600
400
200
0

Hour

| 70 | 703 | 704 | 705 | 706 | 707 | 708 | 709 | 710 | 711 | 712 | 713 | 714 | 715 | 716 | 717 | 718 | 719 | 720 |

◄ **Hour**

MSU Contribution Based Totals (per Hour)

| 278 | 307 | 322 | 334 | 351 | 406 | 421 | 439 | 505 | 652 | 669 | 725 | 769 | 601 | 563 | 542 | 472 | 394 | 361 | 348 |

◄ **MSU Contribution Based Totals**

MSU

800
600
400
200

◄ **Peak** (Last 24 Hours)

30 days = 720 Hours

Understanding the 4-Hour Rolling Average
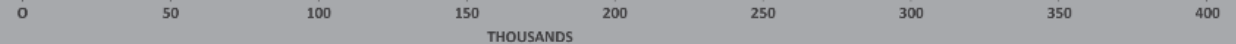
704

is your peak 4-Hour Rolling Average so the bill should look this:

504   566   638   **704**
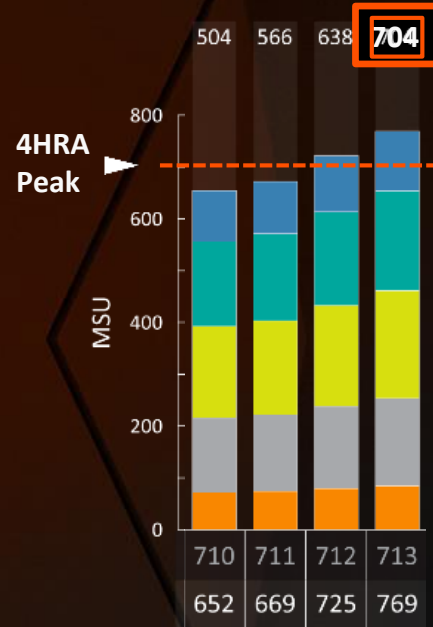
4-Hour Rolling Average peak value is applied to **EACH** of the contribution values

▼

MSU Contribution		*	Rate	=	Cost		
z/OS	704		$110 / MSU		$11,550	►	$77,440
CICS	704		$72 / MSU		$12,816	►	$50,688
DB2	704		$75 / MSU		$14,175	►	$52,800
Other MLC	704		$45 / MSU		$7,065	►	$31,680
IMS	704		$125 / MSU		$9,375	►	$88,000

4HRA Peak

MSU

800
600
400
200
0

| 710 | 711 | 712 | 713 |
| 652 | 669 | 725 | 769 |

Average Contribution Values (for each MSU)

$54,981 Total Charge

$300,608 ACTUAL Charge

TOTAL COST $

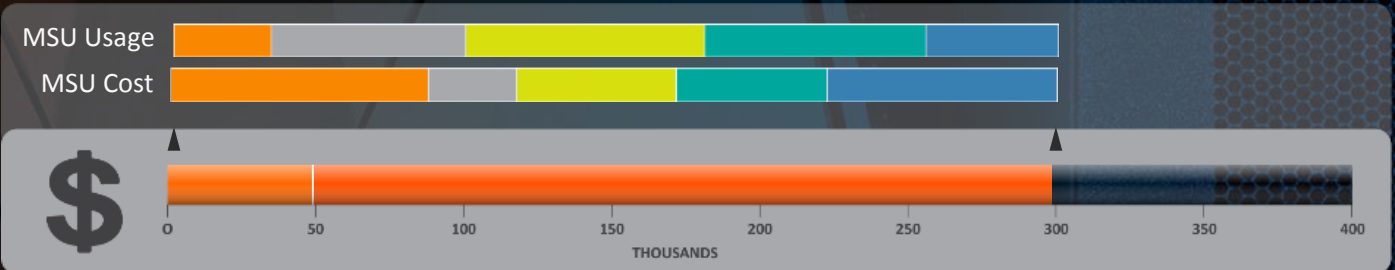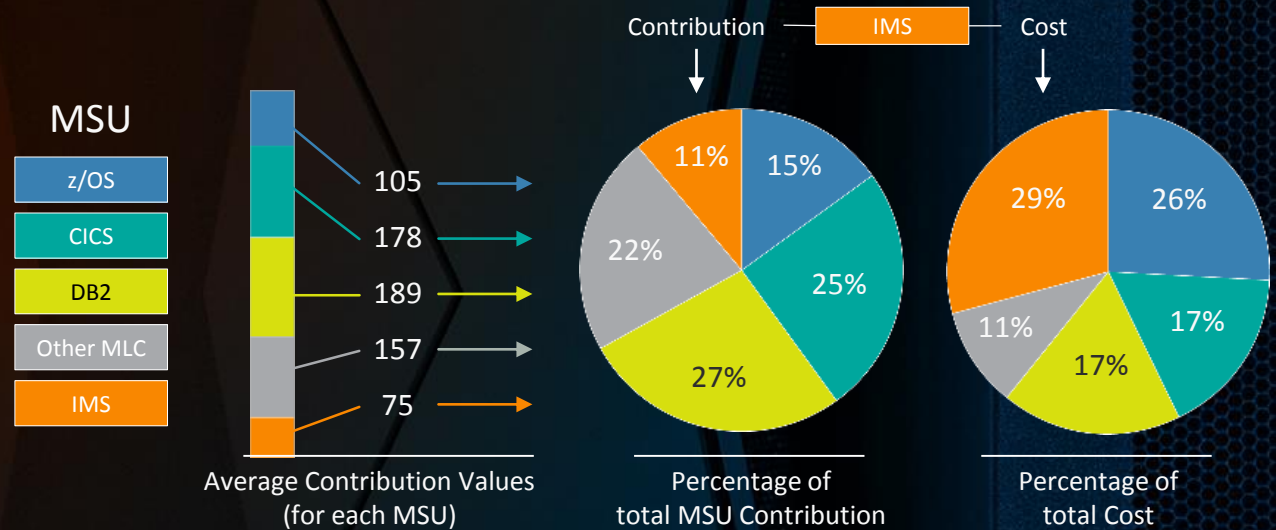0   50   100   150   200   250   300   350   400

THOUSANDS

The Impact of MLC Complexity

Our use case illustrates how IMS * may only be 11% of your contribution but it is representing 29% of your bill

* All products are charged for 704 MSUs but IMS is charged at the highest cost/MSU
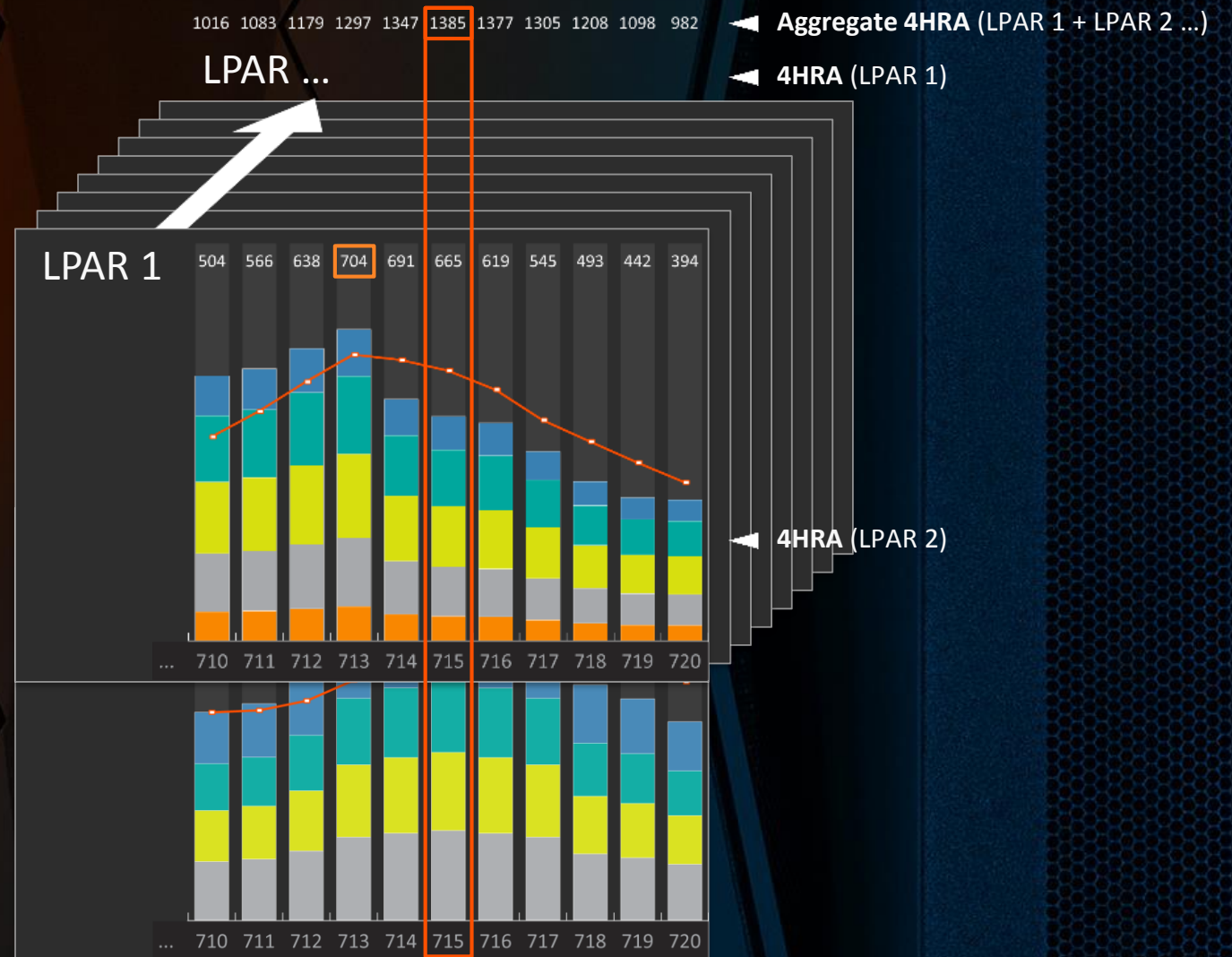
MSU

- z/OS
- CICS
- DB2
- Other MLC
- IMS

Average Contribution Values (for each MSU)

- 105
- 178
- 189
- 157
- 75

Contribution — IMS — Cost

Percentage of total MSU Contribution

- 11%
- 15%
- 25%
- 27%
- 22%

Percentage of total Cost

- 29%
- 26%
- 17%
- 17%
- 11%

MSU Usage
MSU Cost

TOTAL COST $

0   50   100   150   200   250   300   350   400

THOUSANDS

Complexity Increases with Multiple LPARs

A <u>product's MLC charge</u>
is based on the highest **aggregate peak** 4-Hour Rolling Average

across all LPARs

To simplify, we will use
2 LPARs as an example

* Note that LPAR 2 does not use IMS
(shown in orange)

LPAR 1	LPAR 2		MSU Usage	*	Rate	=	Cost
✓	✓	z/OS	**1385**		$110 / MSU		$152,350
✓	✓	CICS	**1385**		$72 / MSU		$99,720
✓	✓	DB2	**1385**		$75 / MSU		$103,875
✓	✓	Other	**1385**		$45 / MSU		$62,325
✓		* IMS	**704**		$125 / MSU		$88,000

$506,270
Total Charge

Aggregate 4HRA (LPAR 1 + LPAR 2 …)

1016 1083 1179 1297 1347 **1385** 1377 1305 1208 1098 982

4HRA (LPAR 1)

LPAR …

LPAR 1

504 566 638 **704** 691 665 619 545 493 442 394

… 710 711 712 713 714 715 716 717 718 719 720

4HRA (LPAR 2)

… 710 711 712 713 714 715 716 717 718 719 720

Free MSUs

4-Hour Rolling Average Totals:

| 243 | 245 | 244 | 243 | 253 | 268 | 287 | 310 | 329 | 353 | 378 | 404 | 443 | 504 | 566 | 638 | 704 | 691 | 665 | 619 | 545 | 493 | 442 | 394 |

4HRA Peak

4HRA Paid For Unused MSUs

FREE!

4HRA

MSU Contribution	*	Rate	=	Cost
z/OS	704	$110 / MSU		$77,440
CICS	704	$72 / MSU		$50,688
DB2	704	$75 / MSU		$52,800
Other MLC	704	$45 / MSU		$31,680
IMS	704	$125 / MSU		$88,00
				$300,608

Hour:

| 697 | 698 | 699 | 700 | 701 | 702 | 703 | 704 | 705 | 706 | 707 | 708 | 709 | 710 | 711 | 712 | 713 | 714 | 715 | 716 | 717 | 718 | 719 | 720 |

MSU Contribution Based Totals:

| 241 | 246 | 245 | 241 | 278 | 307 | 322 | 334 | 351 | 406 | 421 | 439 | 505 | 652 | 669 | 725 | 769 | 601 | 563 | 542 | 472 | 394 | 361 | 348 |

Peak (Last 24 Hours)

30 days = 720 Hours

Transparency and Analysis Drive Savings

How are costs allocated across the LPARs on a CPC? In a sysplex?

- Identify software consolidation opportunities

Which workloads are contributing the most to my peak 4HRA and my MLC costs?

- Reduce, cap or move low importance workloads
- Lower Defined Capacity to throttle discretionary workloads
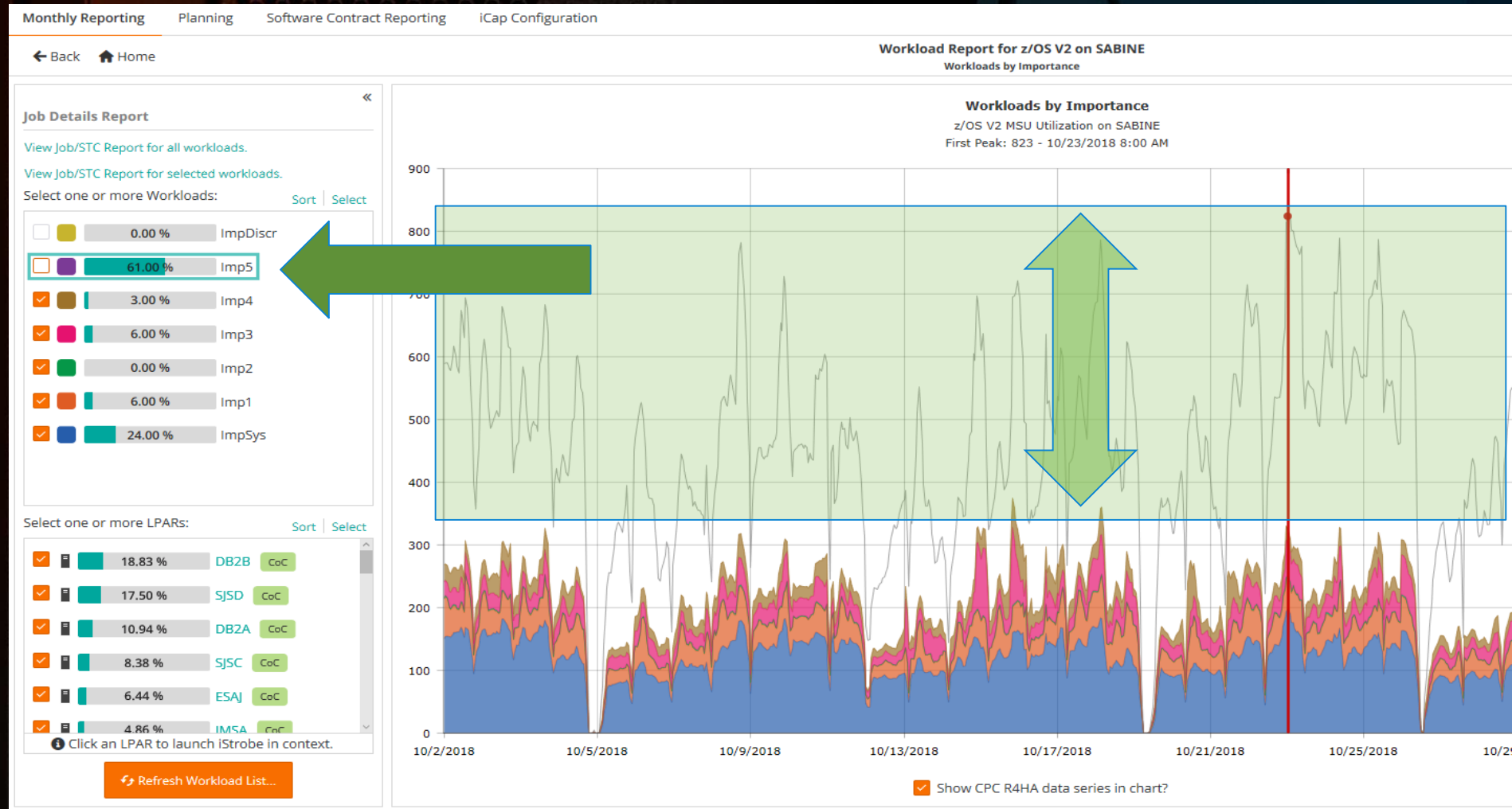
Savings possibilities

Stop consumption over a certain level

Reduce cpu consumption around the peak

Move MLC software entirely off an LPAR

Turn all monitoring off during the peak…

Approach our tuning in a totally new way

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Tune or Reschedule Database Batch Jobs

- **Identify the most significant batch jobs**
- **Tune for performance to reduce CPU overhead and MLC costs**

Capping

MLC Savings

Sets a ceiling on MSU usage
- Consumption cannot exceed a pre-defined level
- If a workload tries, it will be held back

SLA Risk

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Reducing CPU Consumption in the R4HA Peak

MSU Usage		*	Rate	=	Cost
z/OS	1108		$150 / MSU		$166,200
CICS	1108		$75 / MSU		$83,100
IMS	1108		$100 / MSU		$110,800
Db2	870		$75 / MSU		$65,250
MQ	450		$25 / MSU		$11,250

$436,600

Total Charge

Reducing by 5%

MSU Usage	*	Rate	=	Monthly Cost	5% Less Cost
z/OS	1108	$150 / MSU		$166,200	$157,890
CICS	1108	$75 / MSU		$83,100	$78,945
IMS	1108	$100 / MSU		$110,800	$105,260
Db2	870	$75 / MSU		$65,250	$61,988
MQ	450	$25 / MSU		$11,250	$10,688
				$436,600	**$414,770**

Total Annual Savings: $261,960

Reducing by 10%

MSU Usage	*	Rate	=	Monthly Cost	5% Less Cost	10% Less Cost
z/OS 1108		$150 / MSU		$166,200	$157,890	$149,580
CICS 1108		$75 / MSU		$83,100	$78,945	$74,790
IMS 1108		$100 / MSU		$110,800	$105,260	$99,720
Db2 870		$75 / MSU		$65,250	$61,988	$58,725
MQ 450		$25 / MSU		$11,250	$10,688	$10,125
				$436,600	**$414,770**	**$392,940**

Total Annual Savings: $523,920

An Example Use Case

Monthly MSU Utilization – Model 2827-412

- LPAR1
- LPAR2
- LPAR3
- Total CEC (LPARs 1-3)

Chart axis values: 0, 200, 400, 600, 800, 1000
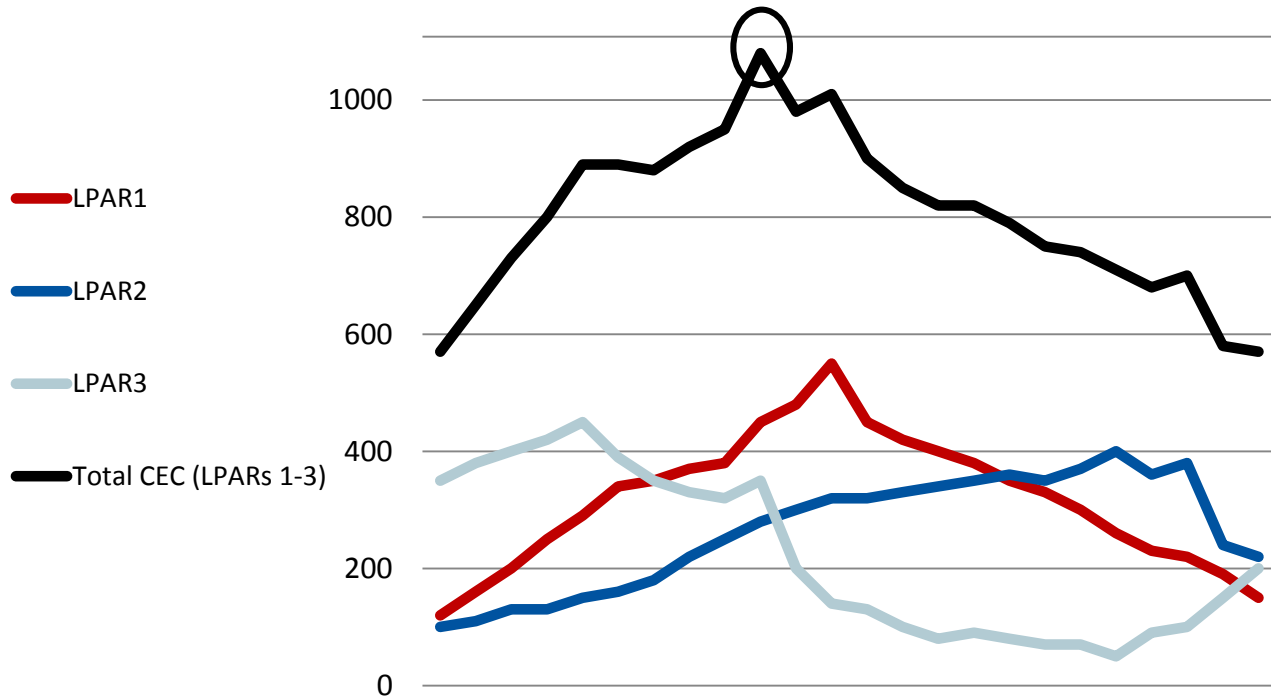
CEC– 1108 MSU

LPAR 1	LPAR 2	LPAR 3
z/OS	z/OS	z/OS
CICS	CICS	CICS
IMS	IMS	IMS
Db2	Db2	Batch
Onlines	Onlines	MQ

LPAR 1	LPAR 2	LPAR 3	MSU Usage	*	Rate	=	Cost
✓	✓	✓	z/OS 1108		$150 / MSU		$166,200
✓	✓	✓	CICS 1108		$75 / MSU		$83,100
✓	✓	✓	IMS 1108		$100 / MSU		$110,800
✓	✓		Db2 870		$75 / MSU		$65,250
		✓	MQ 450		$25 / MSU		$11,250

$436,600
Total Charge

Move IMS off LPAR 1

Monthly MSU Utilization – Model 2827-412

Legend:
- LPAR1 (red)
- LPAR2 (blue)
- LPAR3 (light blue)
- Total CEC (LPARs 1-3) (black)
- LPAR2 and LPAR 3 (gray)

IMS: 630 MSUs
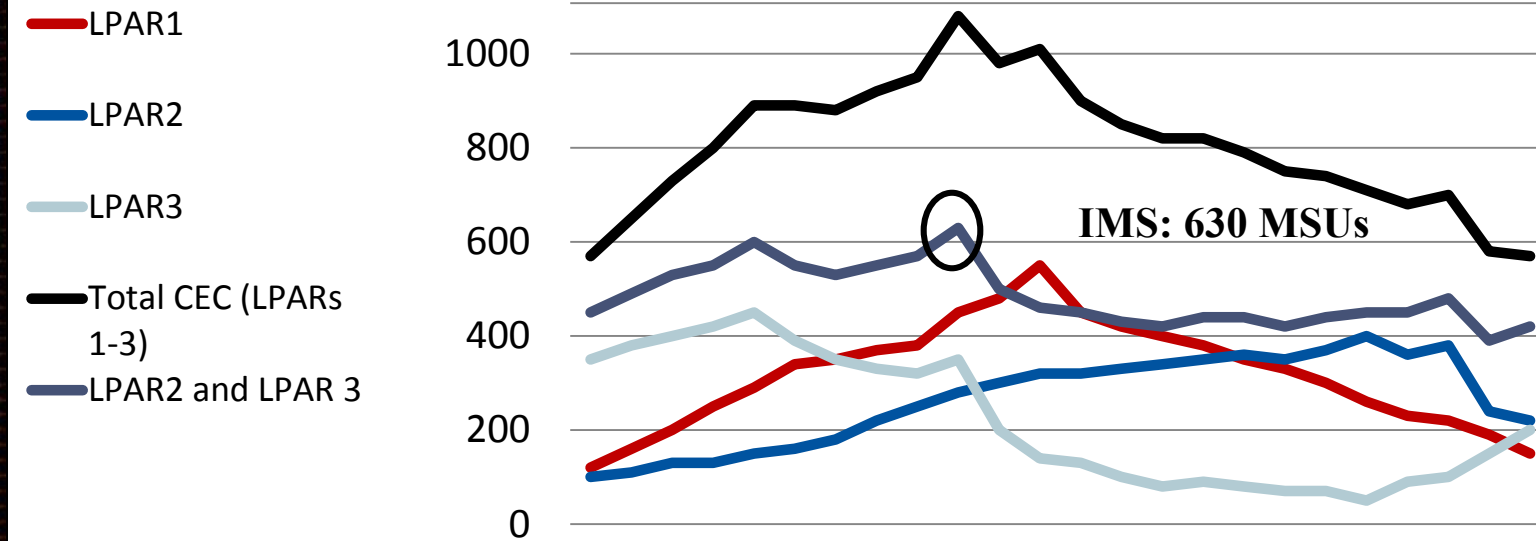
CEC– 1108 MSU

LPAR 1	LPAR 2	LPAR 3
z/OS CICS Db2 Onlines	z/OS CICS IMS Db2 Onlines	z/OS CICS IMS Batch MQ

LPAR 1	LPAR 2	LPAR 3	MSU Usage	*	Rate	=	Cost
✓	✓	✓	z/OS 1108		$150 / MSU		$166,200
✓	✓	✓	CICS 1108		$75 / MSU		$83,100
	✓	✓	IMS 630		$100 / MSU		$63,000
✓	✓		Db2 870		$75 / MSU		$65,250
		✓	MQ 450		$25 / MSU		$11,250

$388,800
Total Charge

Savings

LPAR 1	LPAR 2	LPAR 3	MSU Usage	*	Rate	=	Cost
✓	✓	✓	z/OS 1108		$150 / MSU		$166,200
✓	✓	✓	CICS 1108		$75 / MSU		$83,100
✓	✓	✓	IMS 1108		$100 / MSU		$110,800
✓	✓		Db2 870		$75 / MSU		$65,250
		✓	MQ 450		$25 / MSU		$11,250

$436,600
Total Charge

LPAR 1	LPAR 2	LPAR 3	MSU Usage	*	Rate	=	Cost
✓	✓	✓	z/OS 1108		$150 / MSU		$166,200
✓	✓	✓	CICS 1108		$75 / MSU		$83,100
	✓	✓	IMS 630		$100 / MSU		$63,000
✓	✓		Db2 870		$75 / MSU		$65,250
		✓	MQ 450		$25 / MSU		$11,250

$388,800
Total Charge

Savings of over 10%
$47,800 per month
$573,600 per year

If moving IMS also changed the CEC peak R4HA you might save EVEN MORE!

Traditional Db2 Tuning

Find the most expensive package that is being executed

Tuning this will immediately save cpu resources	Especially if the package is executed frequently

Find the most expensive SQL statement

Tuning this statement saves cpu	And may also improve response time	May NOT be part of the most expensive package

And everyone is happy – right?

Did we actually save any MONEY?	If what we tuned is NOT contributing to the R4HA peak, then we didn't

Db2 Tuning and MLC

Talk to capacity planners (or whoever) and identify when the R4HA peak period occurs

| This window is your opportunity to save REAL MONEY | Focus your analysis tools on this period |

Find the most expensive package or SQL statement being executed IN THAT WINDOW

| Tuning this statement saves MSUs | And may also improve response time | But also reduces the size of the R4HA peak |

And everyone is happy – right?

| Yes, because we reduced our Db2 MLC bill | AND potentially also for other MLC software on the LPAR/CEC as well |

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More Db2 Thoughts

Look at new Db2 features for reducing cpu

Multi Row fetch, for example

Yes, they will cost money to implement

BUT the savings can be greater, and ongoing

And not just for Db2!

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Surprises

Any MLC software that is ACTIVE during the peak will be charged

If you don't NEED CICS/ IMS, Db2 etc to be up, then don't keep them up

Consider Data Sharing members

Active but not being used costs money

Inactive (down) does NOT

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Workloads and MLC

Don't limit tuning to solely Db2

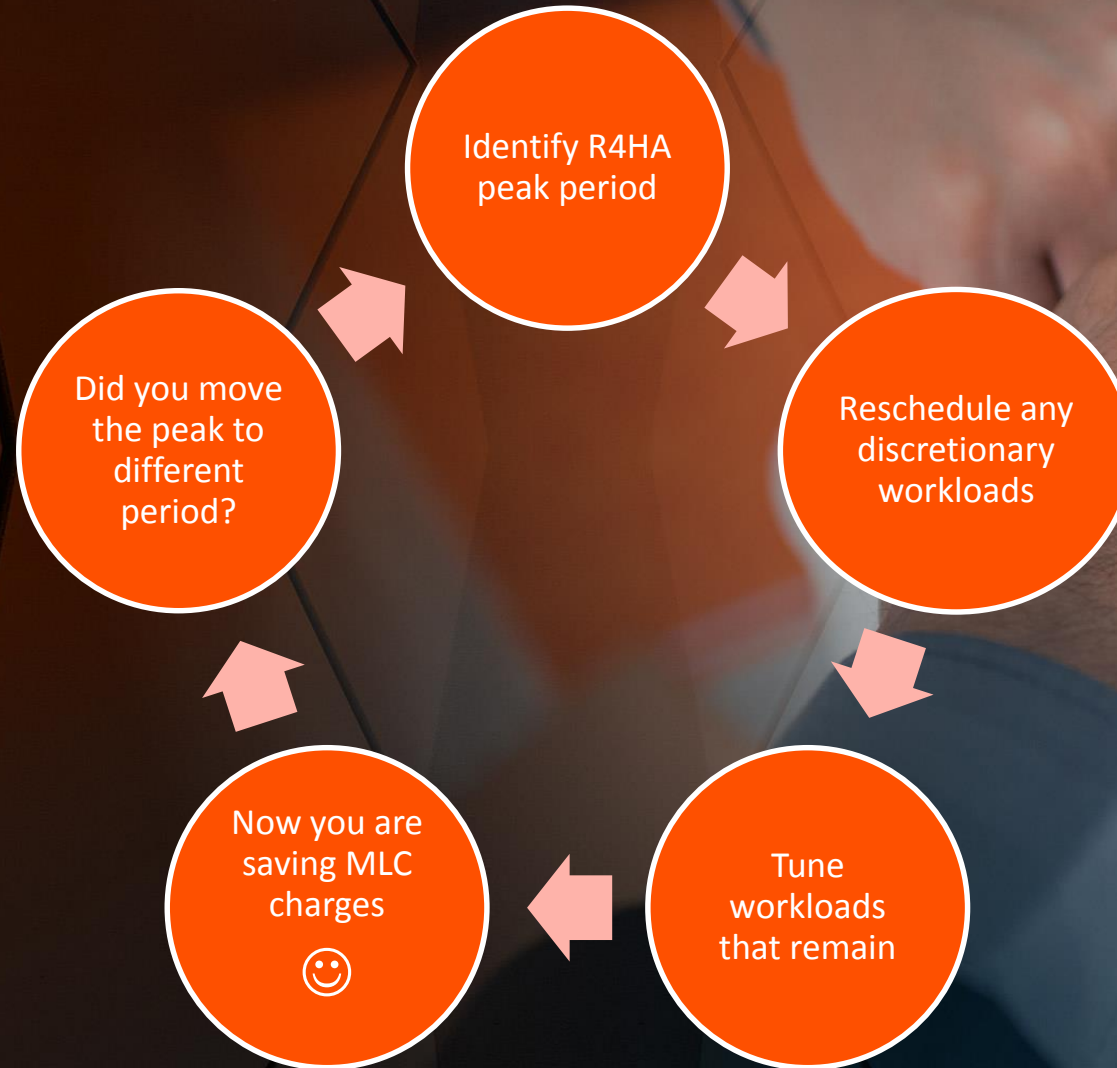Someone should examine EVERYTHING that is executing in the R4HA peak

Is everything as efficient as it can be?

Are there alternatives that can save cpu?

Saving money is about much more than acquisition costs

The savings can be SIGNIFICANT, as we saw

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MLC tuning – never ending cycle

Identify R4HA peak period

Reschedule any discretionary workloads

Tune workloads that remain

Now you are saving MLC charges ☺

Did you move the peak to different period?

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The Evolution of IBM Pricing Models

Full Capacity

- Charged on full machine capacity
- Key metrics are total MSUs or MIPS

Sub Capacity MLC

- Charged on peak MSU contribution each month
- Key metric is 4-Hour Rolling Average (4HRA)

Mobile Workload

- Charged on transactions starting on mobile platforms
- Offers 60% MSU reduction on MLC

Tailored Fit Pricing

- Charged on isolated mainframe workloads
- Discounts for growth or new business applications

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Introducing Tailored Fit Pricing

1. **Application Development and Test Solution (DevTest)**
   - Fixed price contract for extracted Development and Test
   - Up to 3x MSU usage increase set against current baseline

2. **New Application Solution (NAS)**
   - Extract new workload MSUs out of MLC
   - Fixed MSU Containers and Variable MSU Options

3. **Enterprise Consumption Solution**
   - Annual MSU commitment (based on past 12 months)
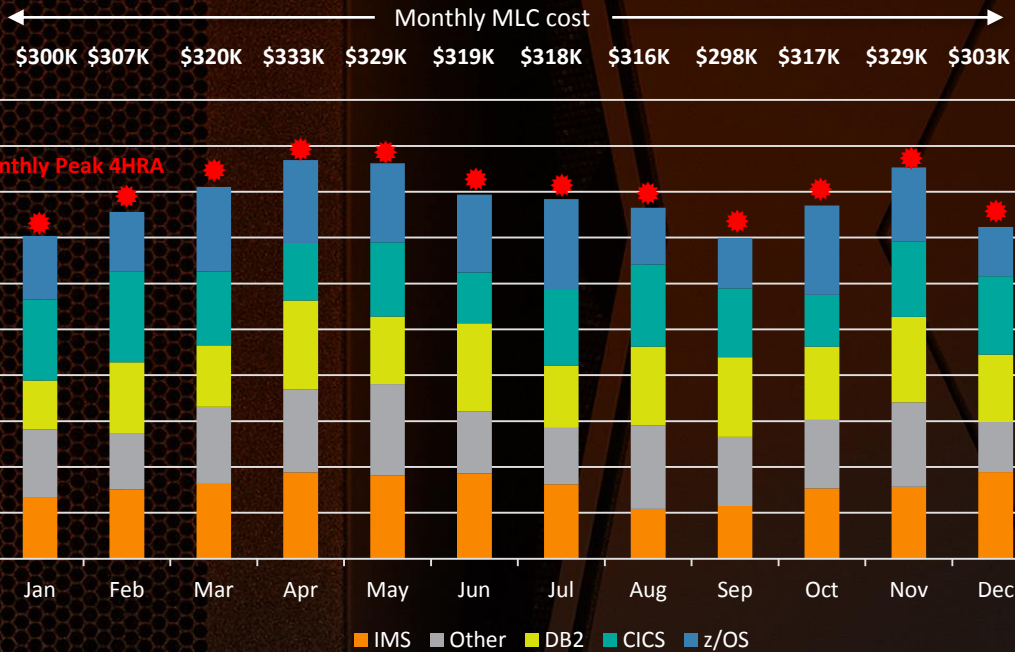   - MSUs above commitment at ~40-60% discount

4. **Enterprise Capacity Solution**
   - Pay for full machine capacity
   - Must be greater than annual MSUs for past 12 month period
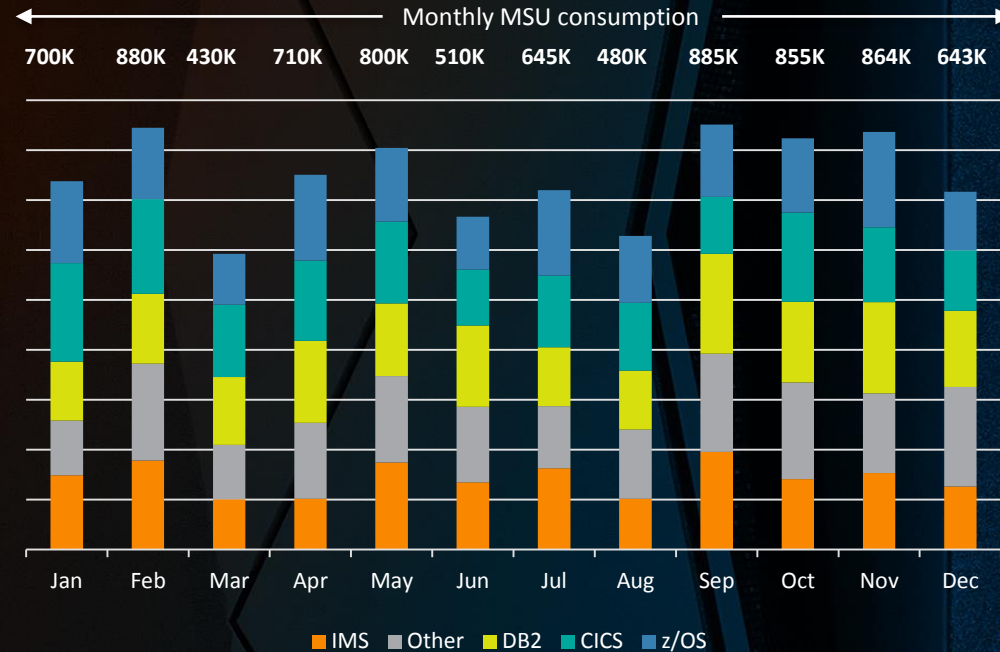
Optimize MLC Before Moving to New Options

Tailored Fit Pricing – Enterprise Consumption Solution Example

Under MLC/peak 4HRA
12 monthly peak 4HRAs determine annual cost

Under Tailored Fit Pricing
12 month aggregate MSU consumption determine annual cost

Monthly MLC cost

| $300K | $307K | $320K | $333K | $329K | $319K | $318K | $316K | $298K | $317K | $329K | $303K |

Monthly Peak 4HRA

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

IMS Other DB2 CICS z/OS

Monthly MSU consumption

| 700K | 880K | 430K | 710K | 800K | 510K | 645K | 480K | 885K | 855K | 864K | 643K |

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

IMS Other DB2 CICS z/OS

400,000 MSUs paid at discounted unit price of .25 per MSU

8.0M MSUs paid as part of annual <u>minimum</u> commitment – determined by last 12 months under MLC model

Annual MLC Cost = $3.79M
(annual MSUs consumed = 8.0M MSUs)

Minimum cost commitment = $3.79M
Over minimum cost = $100K
Total cost = $3.89M for 8.4M annual MSUs

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For Success with Tailored Fit Pricing

Don't get stuck with a poorly optimized environment forever!

Optimize your costs and environment *before* moving to Tailored Fit Pricing:

- Minimize baseline MLC spend <u>NOW</u>

- Right size your capacity

- Use more efficient tools and software

EVERY MSU COUNTS

Questions?

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Dock into the Dark Side!

Tuesday 5th November

Start Time	End Time	Stream	Room	Title	Speaker
16:45	17:45	zCMPA	Woodcote	Hiperdispatch – SLA improvements & MSU reductions	Donald Zeunert
16:45	17:45	Db2	Nurburgring	MLC – I'm paying HOW MUCH for Db2?	Phil Grainger

Wednesday 6th November

Start Time	End Time	Stream	Room	Title	Speaker
11:45	12:45	IMS	Wellington B	Modernizing IMS Change Management	David Schipper
13:45	14:45	IMS	Wellington B	IMS10: Using Real-Time IMS Data for Security Analysis	Nick Griffin
16:30	19:30	IMS	Wellington B	Innovative Customer Solutions to IMS Challenges	David Schipper

Thursday 7th November

Start Time	End Time	Stream	Room	Title	Speaker
09:00	10:00	Db2	Nurburgring	Putting the capital A in 'Agile on the mainframe'	Tony Poole
11:45	12:45	Db2	Nurburgring	Express Yourself	Marcus Davage

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