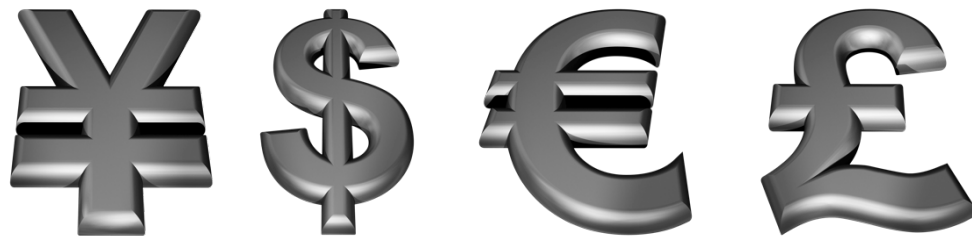# FINANCIAL BENEFITS OF DB2 10 PERFORMANCE: PRACTICE

Why, How & Where Performance matters

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IBM Champion

Paris May 2012

DISCLAIMER

PLEASE BE AWARE THAT THE ACTUAL PROGRAMMING TECHNIQUES, ALGORITHMS AND ALL NUMERICAL PARAMETERS USED IN EXAMPLES GIVEN IN THIS PRESENTATION ARE SUBJECT TO CHANGE AT SOME FUTURE DATE EITHER BY A NEW VERSION OF DB2, A NEW RELEASE, A SMALL PROGRAMMING ENHANCEMENT (SPE) OR A PROGRAMMING TEMPORARY FIX (PTF).

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DB2 IS A TRADEMARK OF INTERNATIONAL BUSINESS MACHINE CORPORATION. THIS PRESENTATION USES MANY TERMS THAT ARE TRADEMARKS. WHEREVER WE ARE AWARE OF TRADEMARKS THE NAME HAS BEEN SPELLED IN CAPITALS.
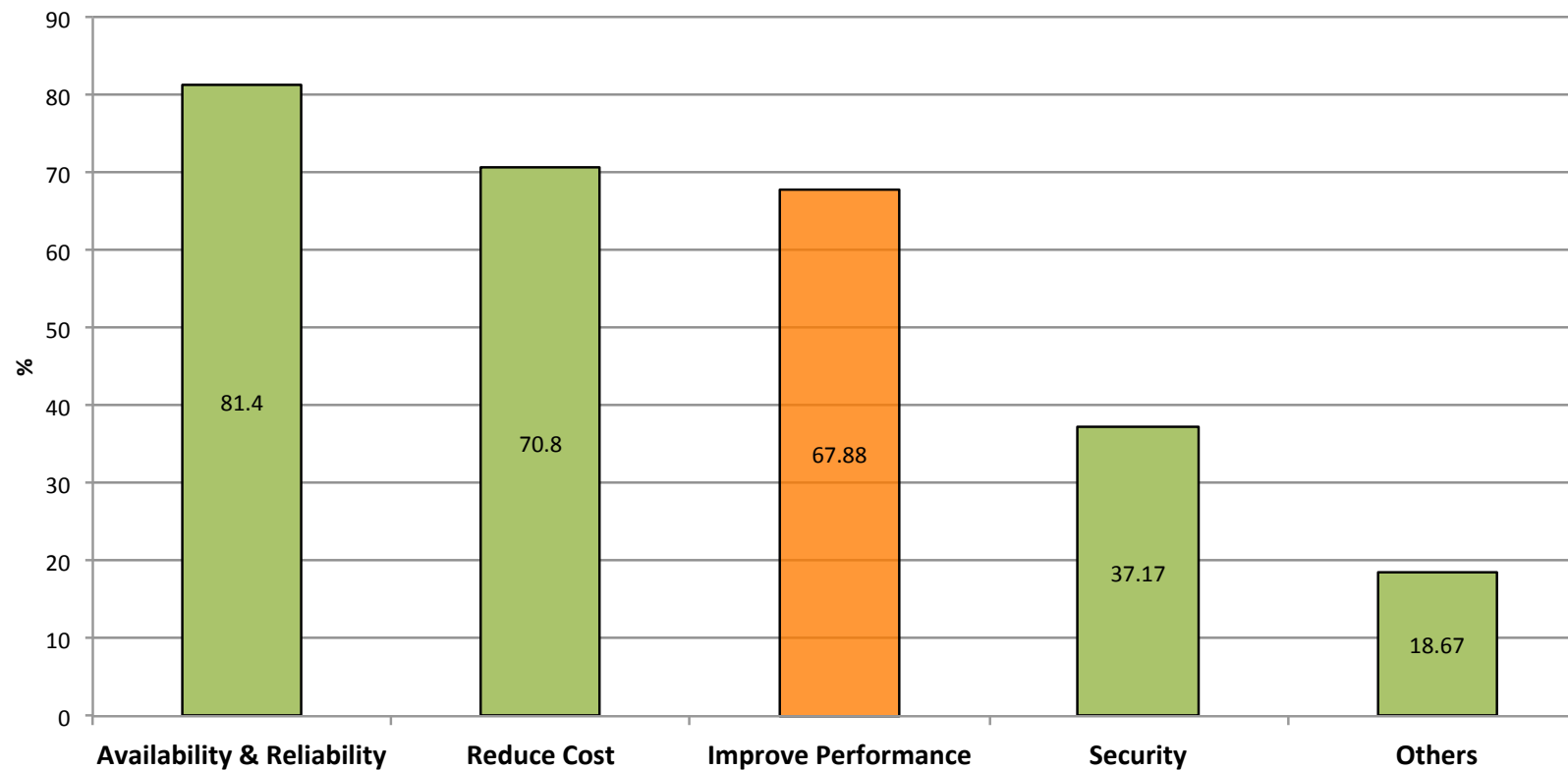
Agenda

→ **Why performance matters?**

→ **DB2 10 Performance Improvements**

→ **Building the DB2 10 Business Case**

→ **Summary & Conclusions**

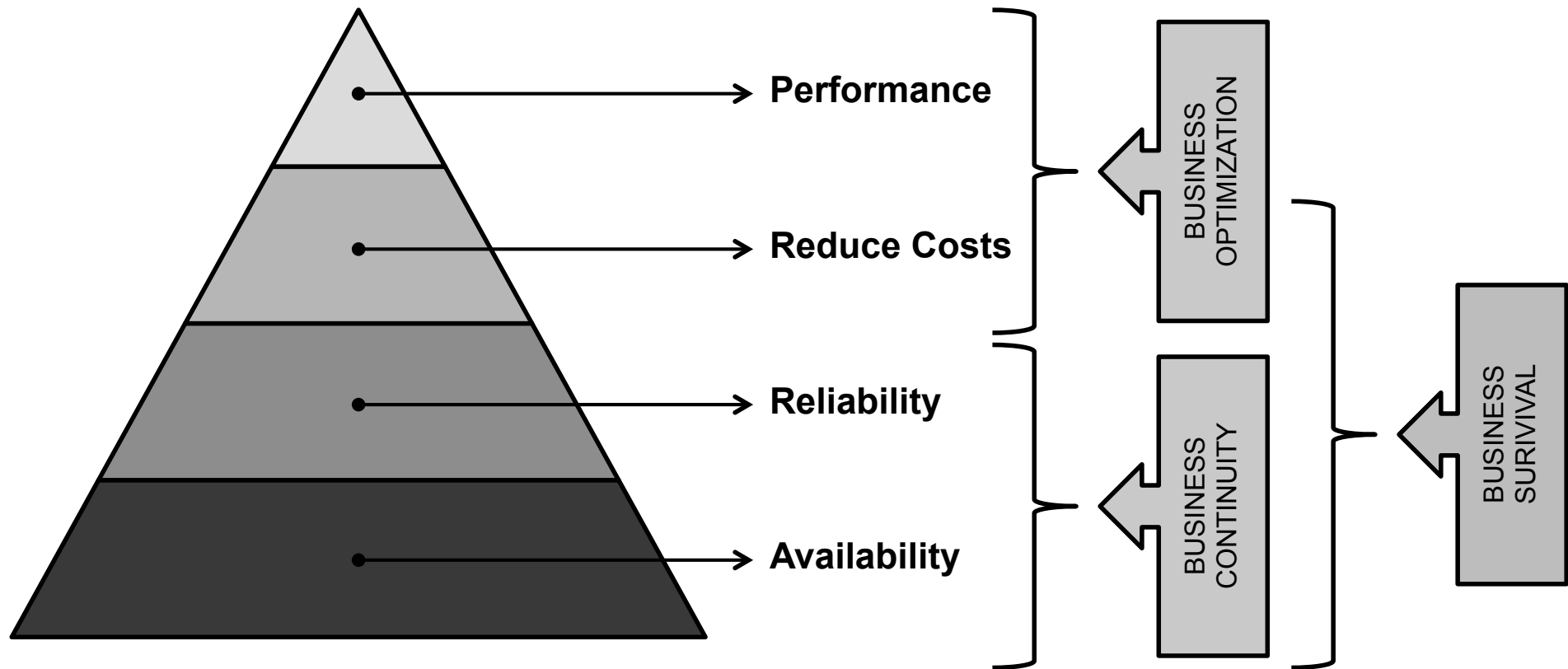# WHY PERFORMANCE MATTERS

Why Performance Matters

→ What are the main concerns of your IT business?

– Source: IDUG Market Research Survey. May 2011

Why Performance matters

→ What are the main concerns of your IT business?

→ A free interpretation of Maslow's hierarchy of needs

Why Performance matters

→ Applications must provide fast and consistent response times in a highly available environment

→ Nowadays, good performance is a necessary condition for the survival of a company and its sustained growth

THIS IS WHY PERFORMANCE MATTERS!

How Performance matters

➜ Good performance **should** address two requirements:

– **Fast response time**

– **Cost reduction** → reduced CPU utilization
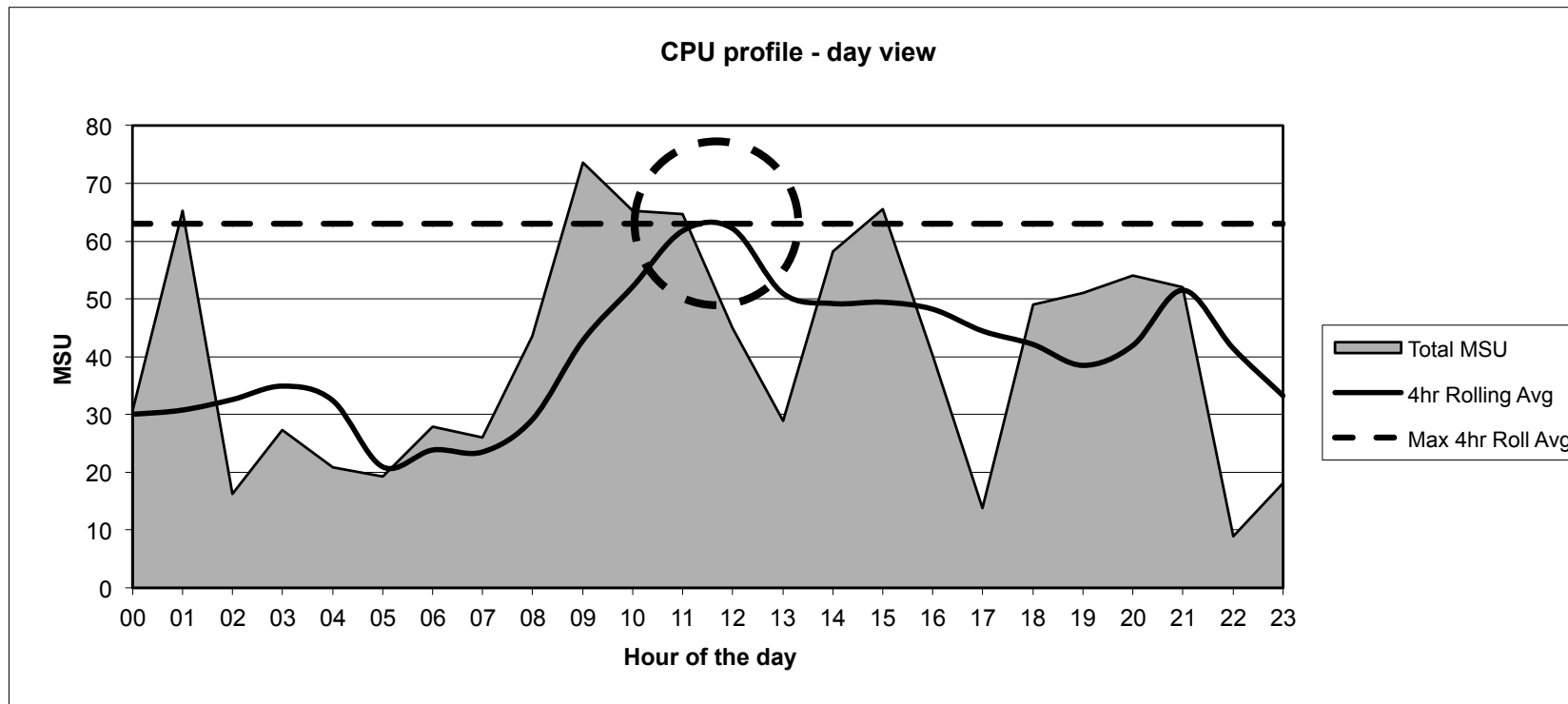
THIS IS HOW PERFORMANCE MATTERS!

➜ It is not only about CPU

➜ Good computer performance may involve

– Short response time

– High throughput

– Low utilization of computing resources

– High availability

Where Performance matters

→ Under Sub-Capacity workload license metrics, the software charges are calculated based on the 4-hour rolling average CPU utilization
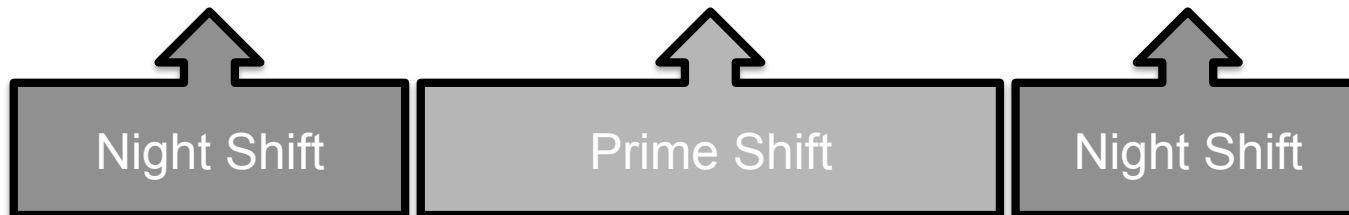
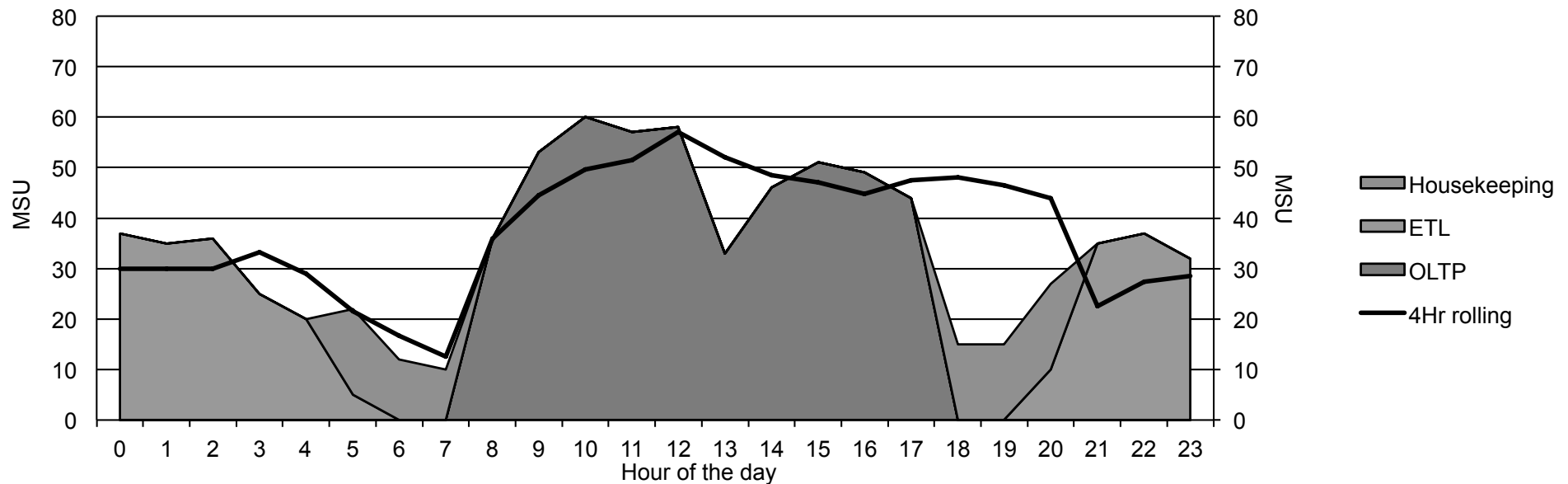→ The focus **_must_** be the **_peak period_**

THIS IS WHERE PERFORMANCE MATTERS!

The performance interval

But to be honest…

→ In **MANY** cases… it is all about the money…

DB2 10 PERFORMANCE IMPROVEMENTS

Some DB2 10 performance features

→ DB2 10 Conversion Mode

- – Improved performance of SQL at runtime
- – Parallel index update at insert
- – Index list prefetch
- – Memory changes exploiting more 64 bit, some after REBIND
- – Increased DDF performance
- – Buffer pool enhancements

→ DB2 10 New Function Mode

- – Caching of dynamic SQL statements with literals
- – SQL Procedure Language performance improvements
- – MEMBER CLUSTER for UTS
- – Hash access path
- – Index include columns
- – Inline large objects (LOBs)

More information

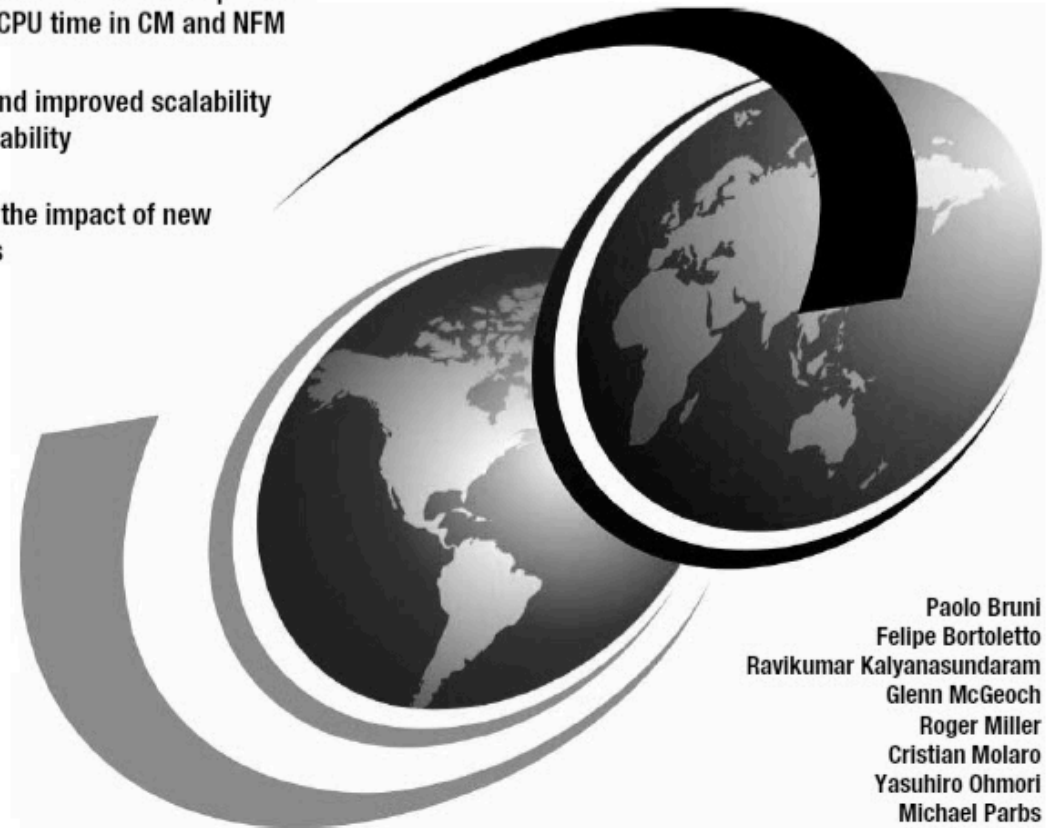cristian@molaro.be - DB2 10 Performance…

DB2 10 for z/OS Performance Topics

Discover the functions that provide reduced CPU time in CM and NFM

Understand improved scalability and availability
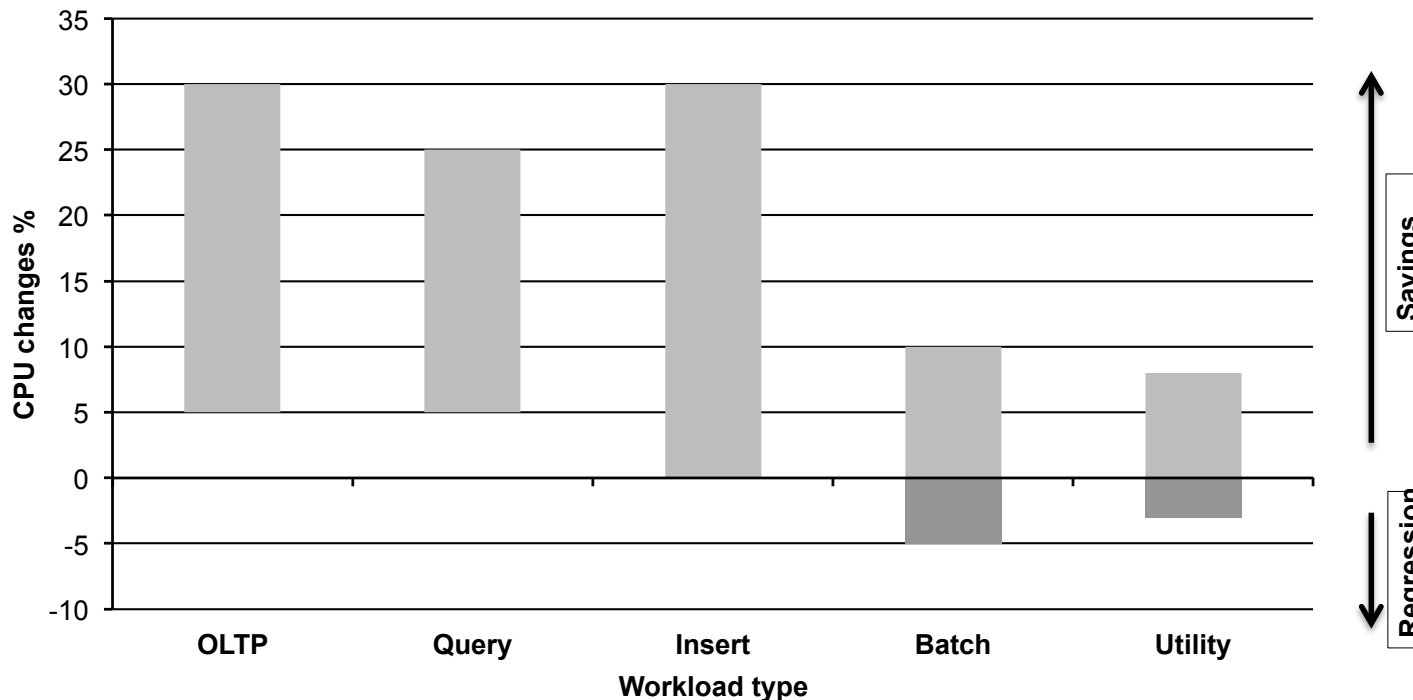
Evaluate the impact of new functions

Paolo Bruni
Felipe Bortoletto
Ravikumar Kalyanasundaram
Glenn McGeoch
Roger Miller
Cristian Molaro
Yasuhiro Ohmori
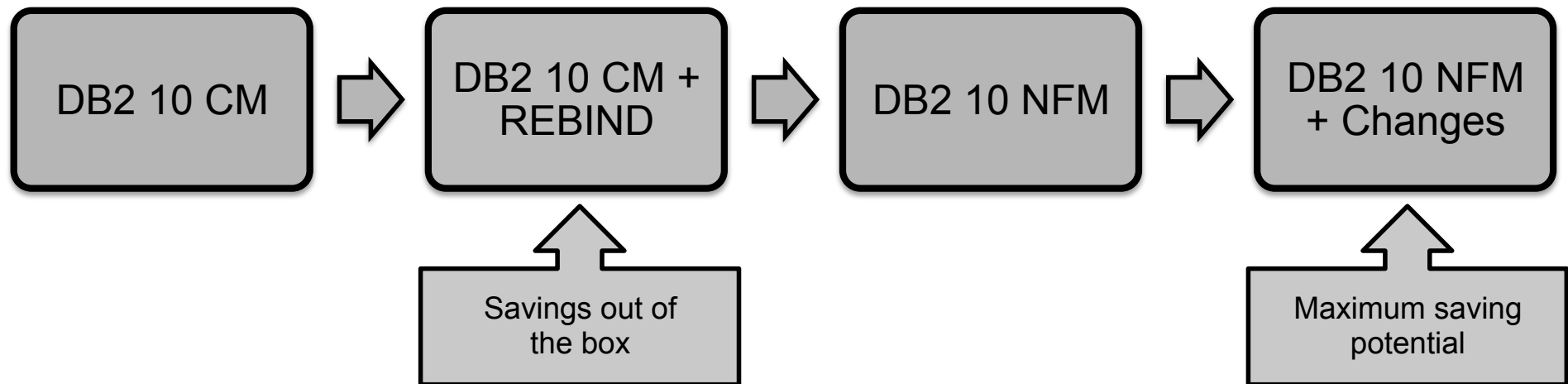Michael Parbs

Redbooks

ibm.com/redbooks

Managing expectations

→ DB2 9 to 10 migration CPU reduction - IBM Benchmarks

IMPORTANT: Almost certainly, any organization will get, in a one way or another, performance benefits from DB2 10.
Certainly, results will vary depending on many conditions

The DB2 10 "Performance" migration path

DB2 10 CM → DB2 10 CM + REBIND → DB2 10 NFM → DB2 10 NFM + Changes
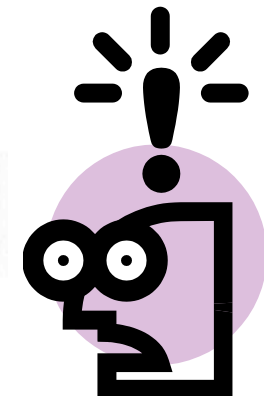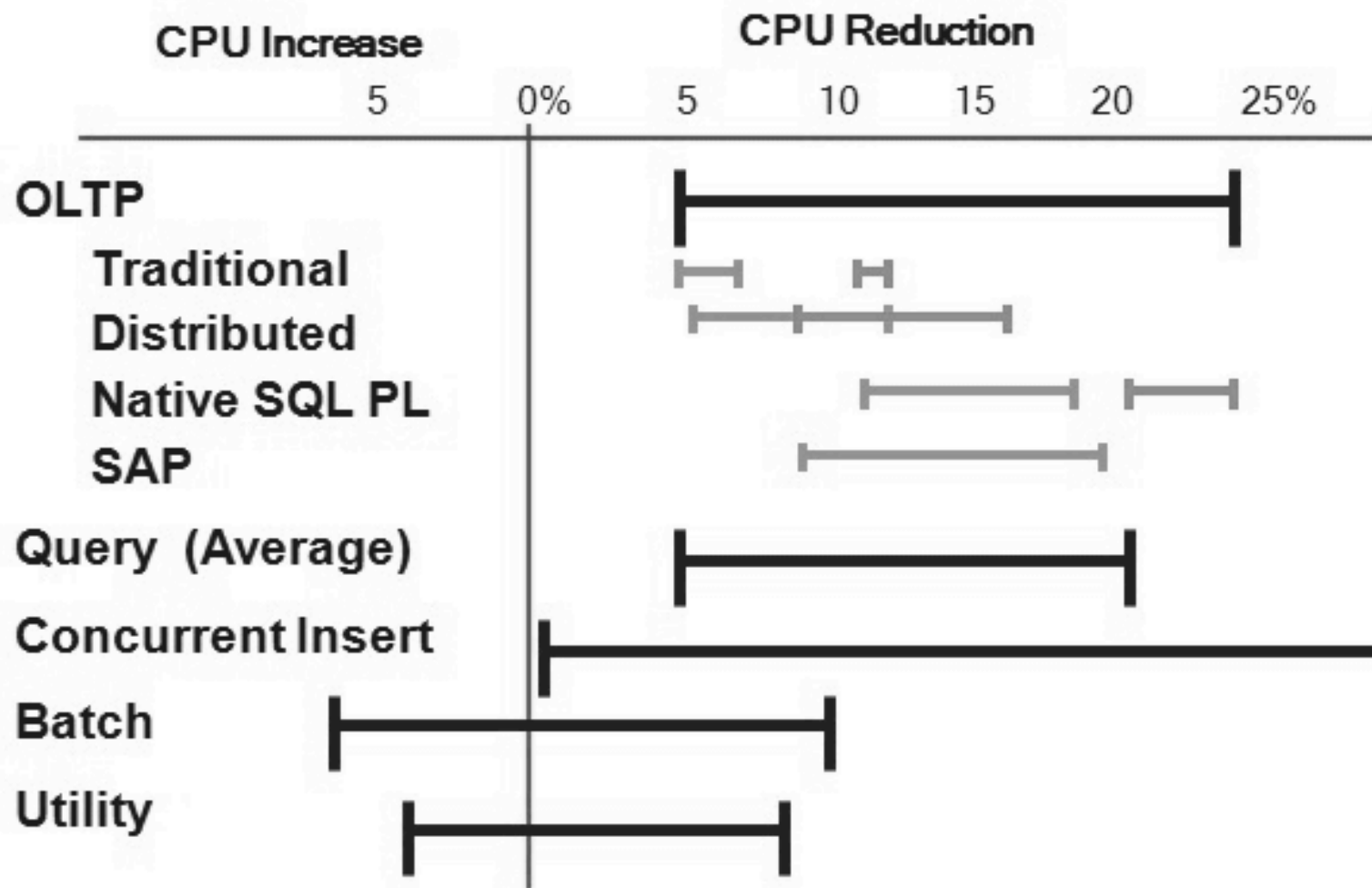
Savings out of the box

Maximum saving potential

→ New in DB2 10: *Savings out of the box*
- Conversion Mode + REBIND

NOT = TRANSPARENT

Managing expectations, another view

→ DB2 9 to 10 migration CPU changes - IBM Benchmarks

Managing expectations, more details

→ Most of workloads:

- – Up to 10% CPU reduction after REBIND packages

- – Higher improvement with workloads:

  - • With scalability issues in DB2 8 / DB2 9

  - • Accessed thru DRDA

→ Sweet Spots:

- – Workload using native SQL procedures: up to 20% CPU reduction after DROP/CREATE or REGENERATE

- – Query workload with positive access path changes

- – Workload with frequent access on small LOB

  - • NFM + Inline LOBs

- – Workload with random, singleton select/update

  - • NFM with Hash access
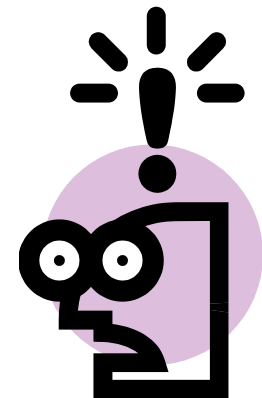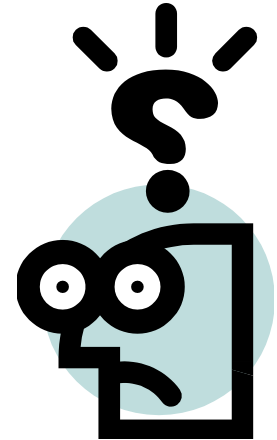
How are others doing?

→ Most important concept to retain: **IT DEPENDS!**

→ Potential savings highly related to:

– Workload type

– Workload distribution
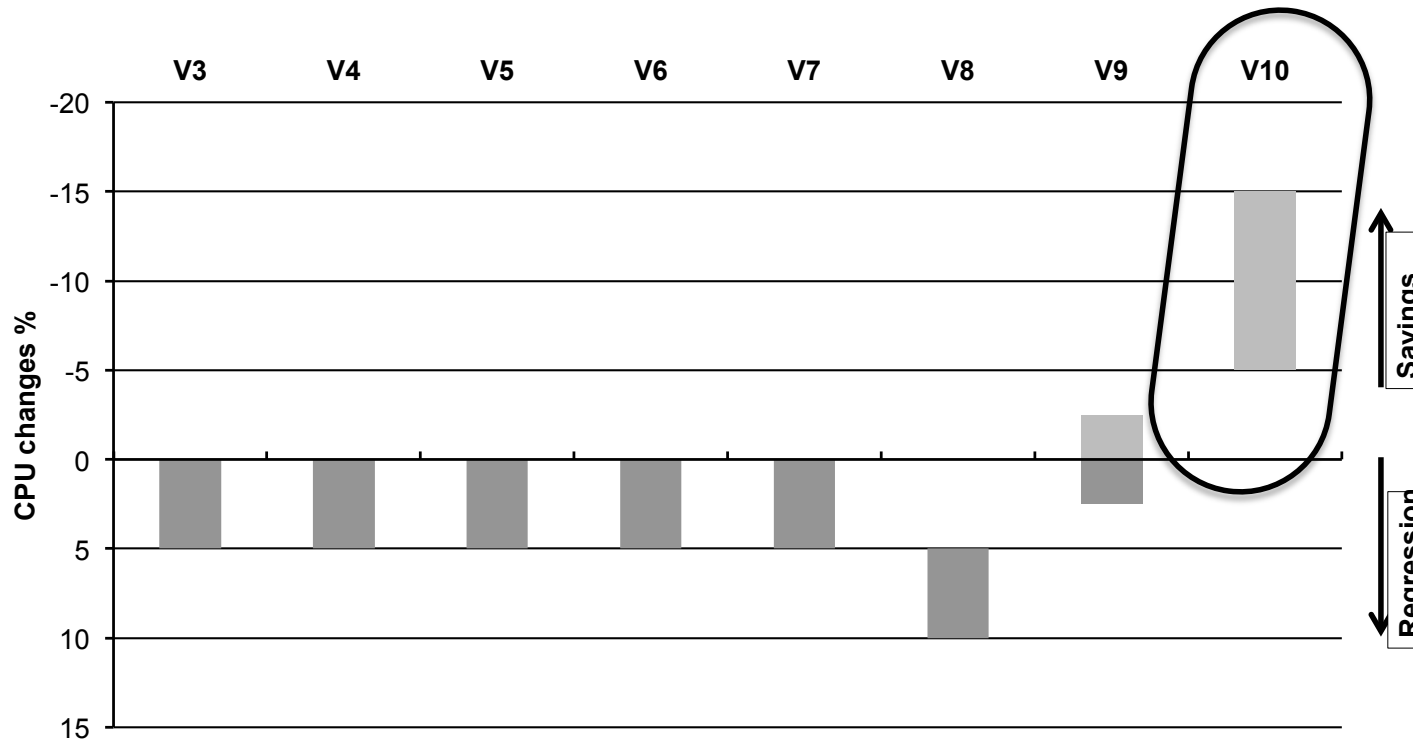
– Were are you coming from?

• V8 → 10

• V9 → 10

💡 **I KNOW ABOUT:** DB2 V8 → DB2 10: NO CPU REGRESSION
(out of the box) DB2 V9 → DB2 10: cases of NOTABLE CPU reduction

DISCLAIMER

DB2 10 performance improvements

→ DB2 10 has proven to deliver:

– CPU reduction → less CPU and more zIIP

– Improved scalability → more threads per DB2

– Productivity enhancements → DBA life is easier
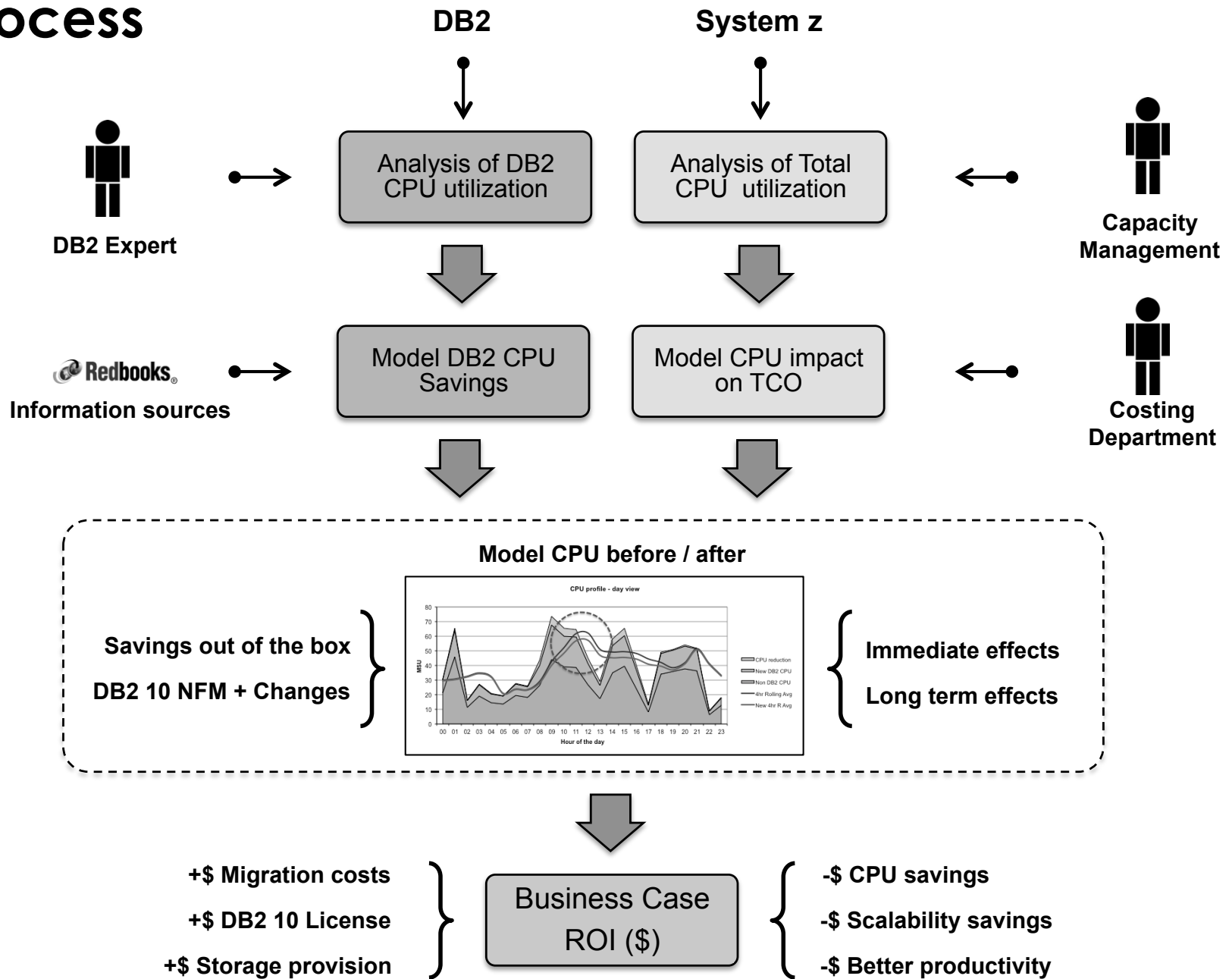
How are others doing? The 0,01% syndrome

→ *"9,99% is not good enough"*

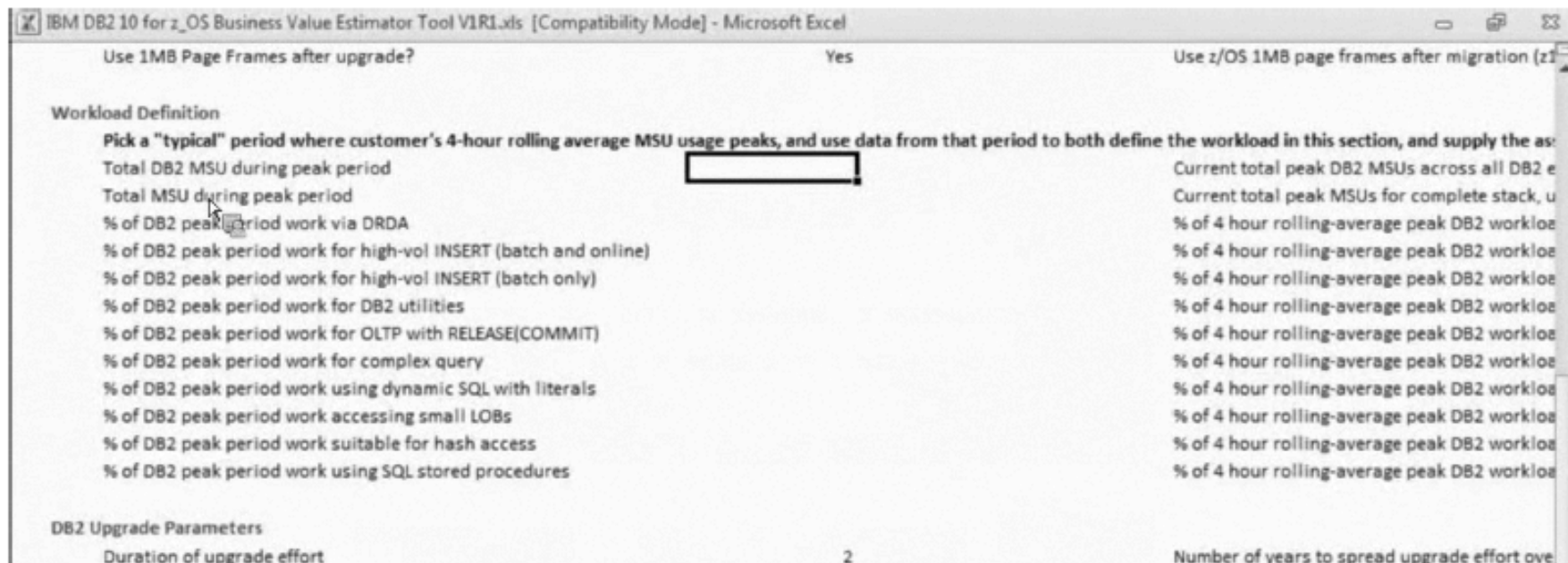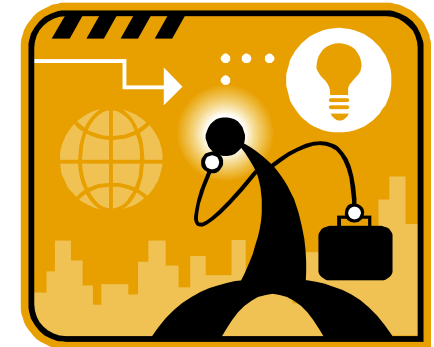**VERY IMPORTANT:** *Always* manage results expectations
This is NOT an exact science

BUILDING THE DB2 10 BUSINESS CASE

The process

DB2

System z

DB2 Expert

Analysis of DB2 CPU utilization

Analysis of Total CPU utilization

Capacity Management

Redbooks
Information sources

Model DB2 CPU Savings

Model CPU impact on TCO

Costing Department

Model CPU before / after

CPU profile - day view

Savings out of the box

DB2 10 NFM + Changes

Immediate effects

Long term effects

+$ Migration costs

+$ DB2 10 License

+$ Storage provision

Business Case ROI ($)

-$ CPU savings

-$ Scalability savings

-$ Better productivity

The IBM Business Value Assessment Estimator Tool

→ Excel-based spreadsheet model

→ Can be used to find *potential* savings

→ It is an *ESTIMATOR*

→ Webcast available:

  – DB2 10 for z/OS – Justify your upgrade using the IBM Business Value Assessment Estimator Tool

  – Replay available at www.ibm.com/software/os/ systemz/webcast/24jan/

IBM DB2 10 for z_OS Business Value Estimator Tool V1R1.xls [Compatibility Mode] - Microsoft Excel

| Use 1MB Page Frames after upgrade? | Yes | Use z/OS 1MB page frames after migration (z1 |

Workload Definition

Pick a "typical" period where customer's 4-hour rolling average MSU usage peaks, and use data from that period to both define the workload in this section, and supply the ass

Total DB2 MSU during peak period		Current total peak DB2 MSUs across all DB2 e
Total MSU during peak period		Current total peak MSUs for complete stack, u
% of DB2 peak period work via DRDA		% of 4 hour rolling-average peak DB2 workloa
% of DB2 peak period work for high-vol INSERT (batch and online)		% of 4 hour rolling-average peak DB2 workloa
% of DB2 peak period work for high-vol INSERT (batch only)		% of 4 hour rolling-average peak DB2 workloa
% of DB2 peak period work for DB2 utilities		% of 4 hour rolling-average peak DB2 workloa
% of DB2 peak period work for OLTP with RELEASE(COMMIT)		% of 4 hour rolling-average peak DB2 workloa
% of DB2 peak period work for complex query		% of 4 hour rolling-average peak DB2 workloa
% of DB2 peak period work using dynamic SQL with literals		% of 4 hour rolling-average peak DB2 workloa
% of DB2 peak period work accessing small LOBs		% of 4 hour rolling-average peak DB2 workloa
% of DB2 peak period work suitable for hash access		% of 4 hour rolling-average peak DB2 workloa
% of DB2 peak period work using SQL stored procedures		% of 4 hour rolling-average peak DB2 workloa

DB2 Upgrade Parameters

| Duration of upgrade effort | 2 | Number of years to spread upgrade effort ove |

cristian(

Reducing TCO by CPU improvements

IMPORTANT: DB2 10's potential to impact your total cost of ownership is related to your pricing model

→ Software-related costs are measured by pricing metrics such as:

– Advanced Workload License Charges (AWLC)

– Advanced Entry Workload License Charges (AWLC)

– Workload License Charges (WLC)

– System z New Application License Charges (zNALC)

– … and many more

→ Software pricing is a complex topic → Ask for help!

→ IBM System z Software Pricing

– www.ibm.com/systems/z/resources/swprice

Example

→ Investigate the CPU distribution during the periods that build up the peak CPU 4hr rolling average:
  – 30% Total CPU → DB2
  – 70% Total CPU → non DB2
→ Estimate CPU reduction provided by DB2 10
  – 20% of the Total DB2 CPU
→ Extrapolate the DB2 CPU reduction to the overall workload
  – 8% Total CPU reduction
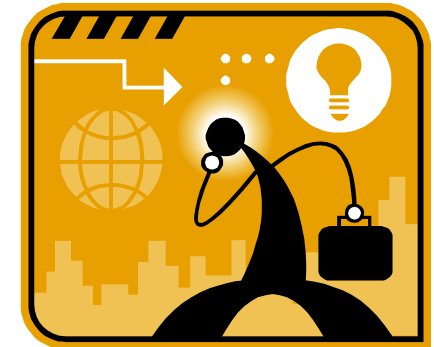
IMPORTANT: The benefits of DB2 10 CPU reductions **MAY** also apply to other eligible IBM products such as z/OS, IMS, CICS, WebSphere MQ, and Lotus Domino

Estimating savings

IMPORTANT: In many license charges models, a reduction in the monthly peak CPU 4-hour rolling average means a reduction of software costs

CPU profile - day view
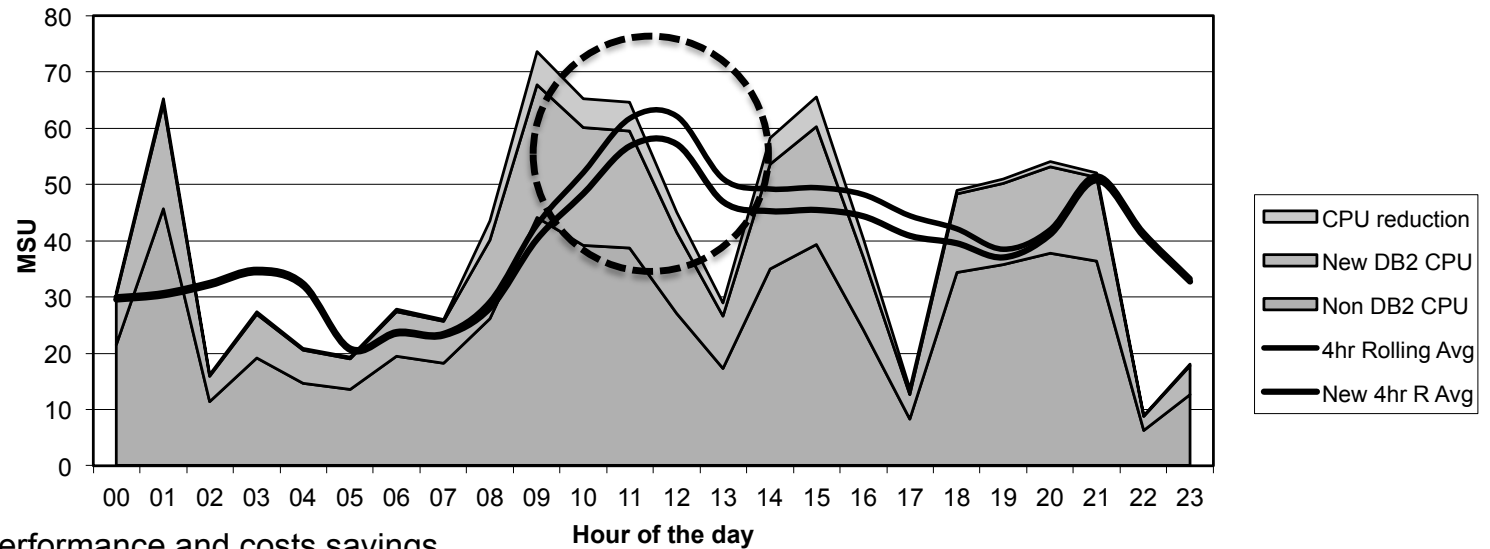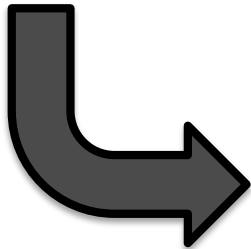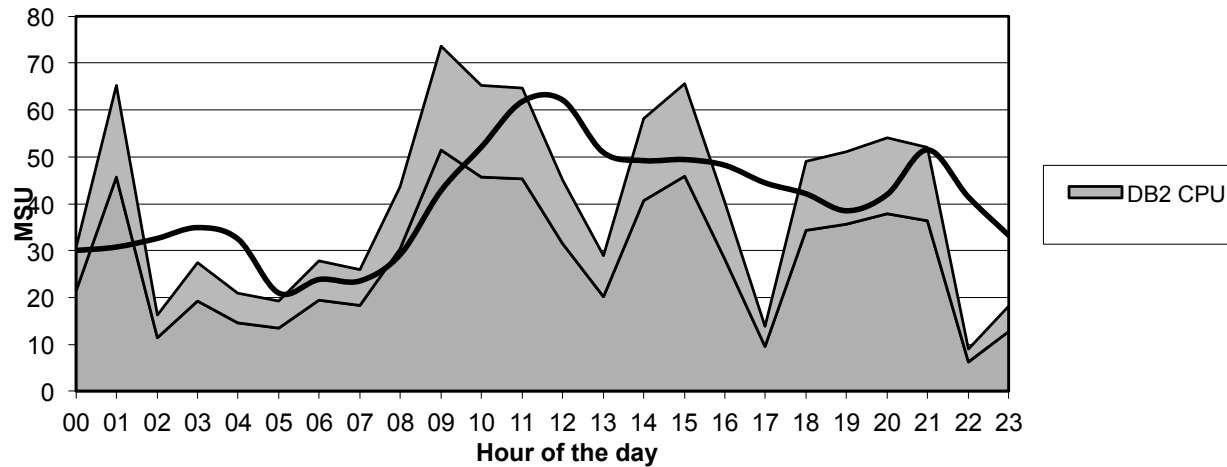
Estimating long term benefits

→ The 4-hour rolling average defines pricing

→ The peak CPU utilization defines response time

CPU profile - day view
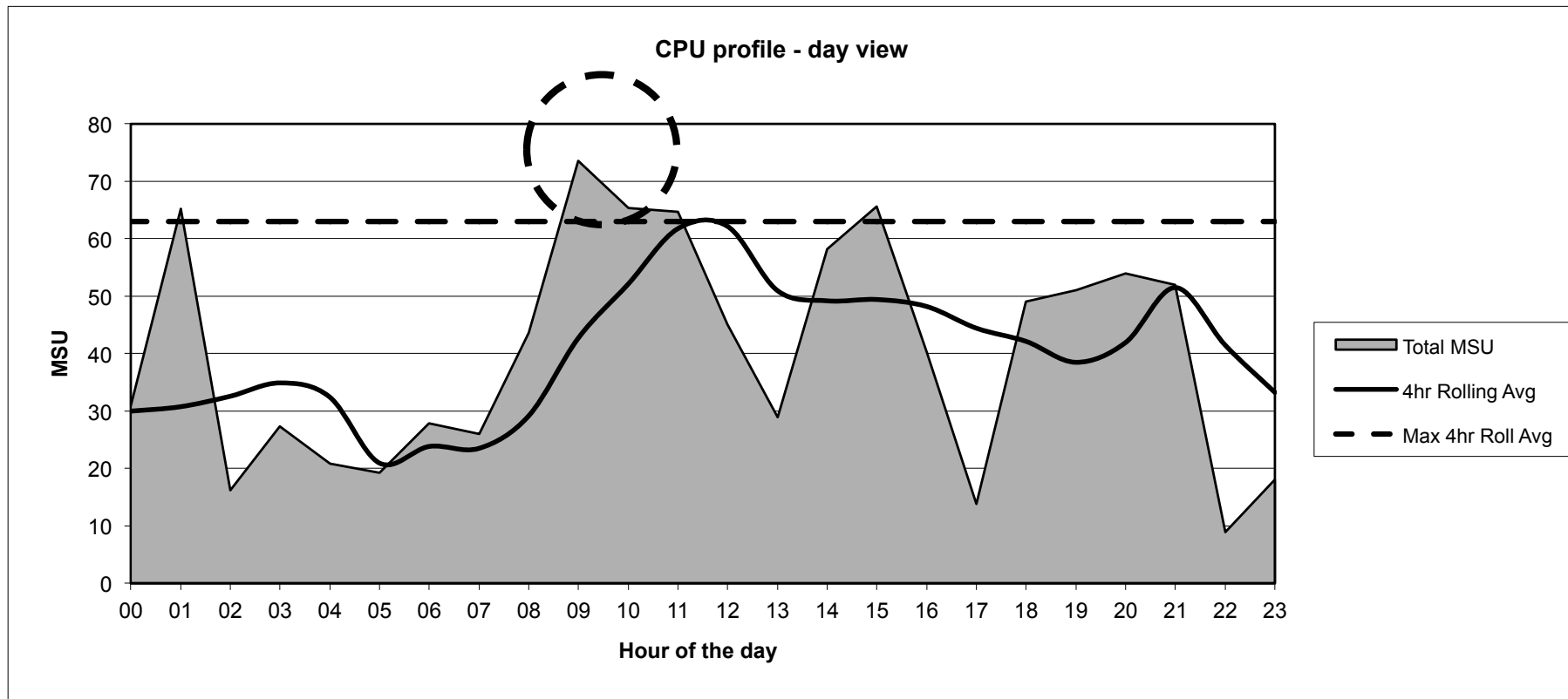
Estimating long term benefits

→ CPU capacity upgrades are usually done in discrete steps
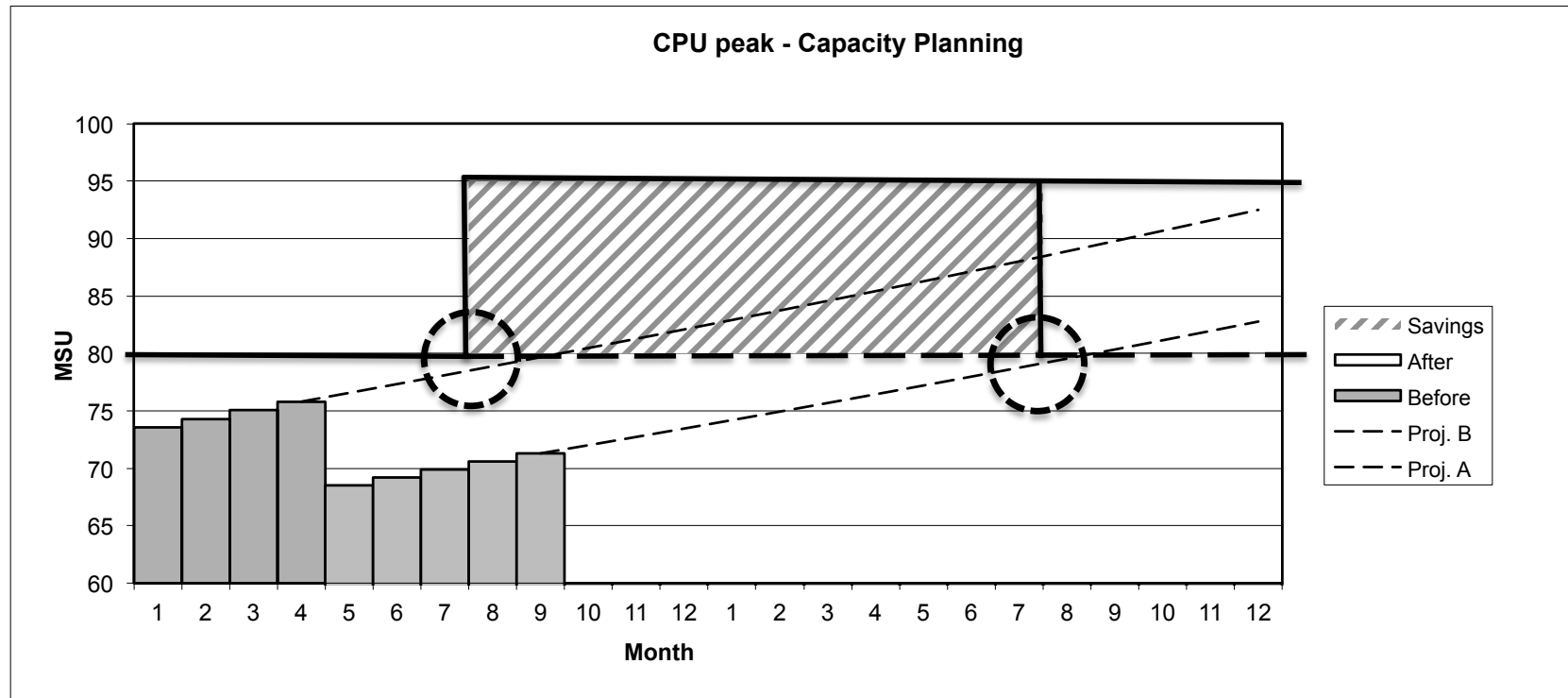
IMPORTANT: The performance benefits of DB2 10 can delay or avoid the need for an increase in CPU capacity by reducing the CPU at peak time

More throughput

→ DB2 10 can improve the throughput of data-intensive processes

- – Logging enhancements

- – Latching contention relief

- – I/O parallelism for index updates

- – Dramatic insert performance enhancements

CPU profile - day view
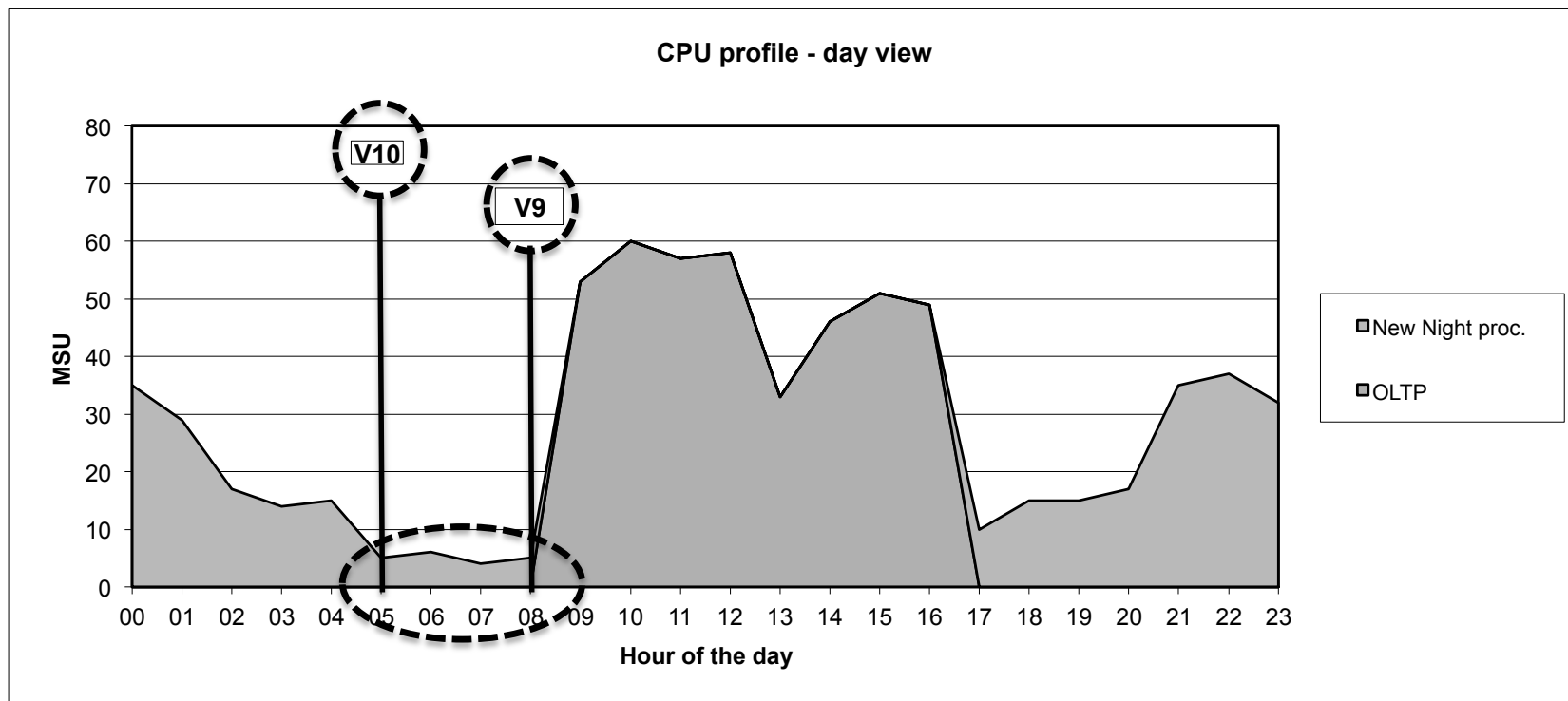
DB2 10 and DS member consolidation

→ Virtual storage can limit the number of concurrent threads for a single DB2 subsystem or Data Sharing member

→ Virtual storage is a very common constraint

DB2 Storage (DBM1) below the 2 GB bar
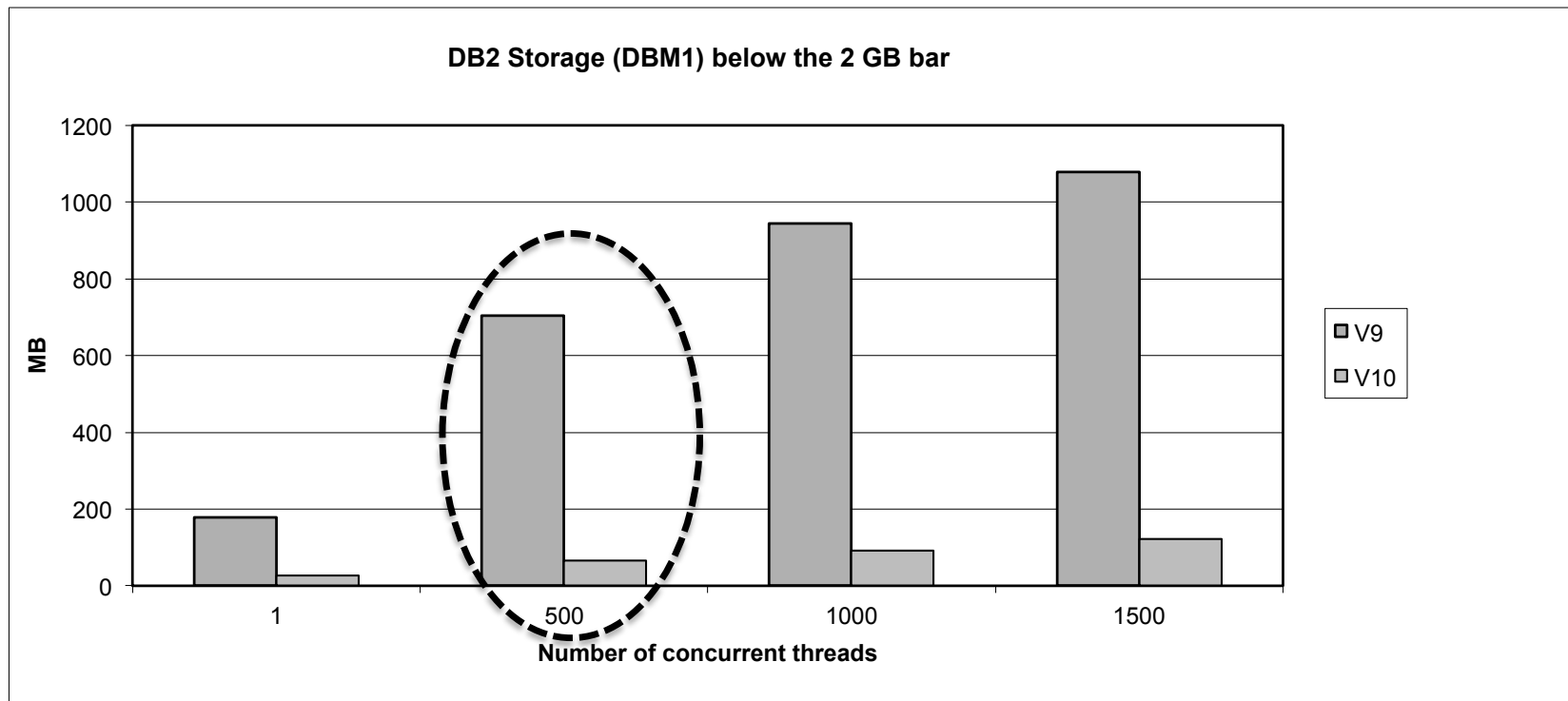
→ DB2 10 allows 5 to10 times more concurrent users → up to 20,000

DB2 10 and DS member consolidation
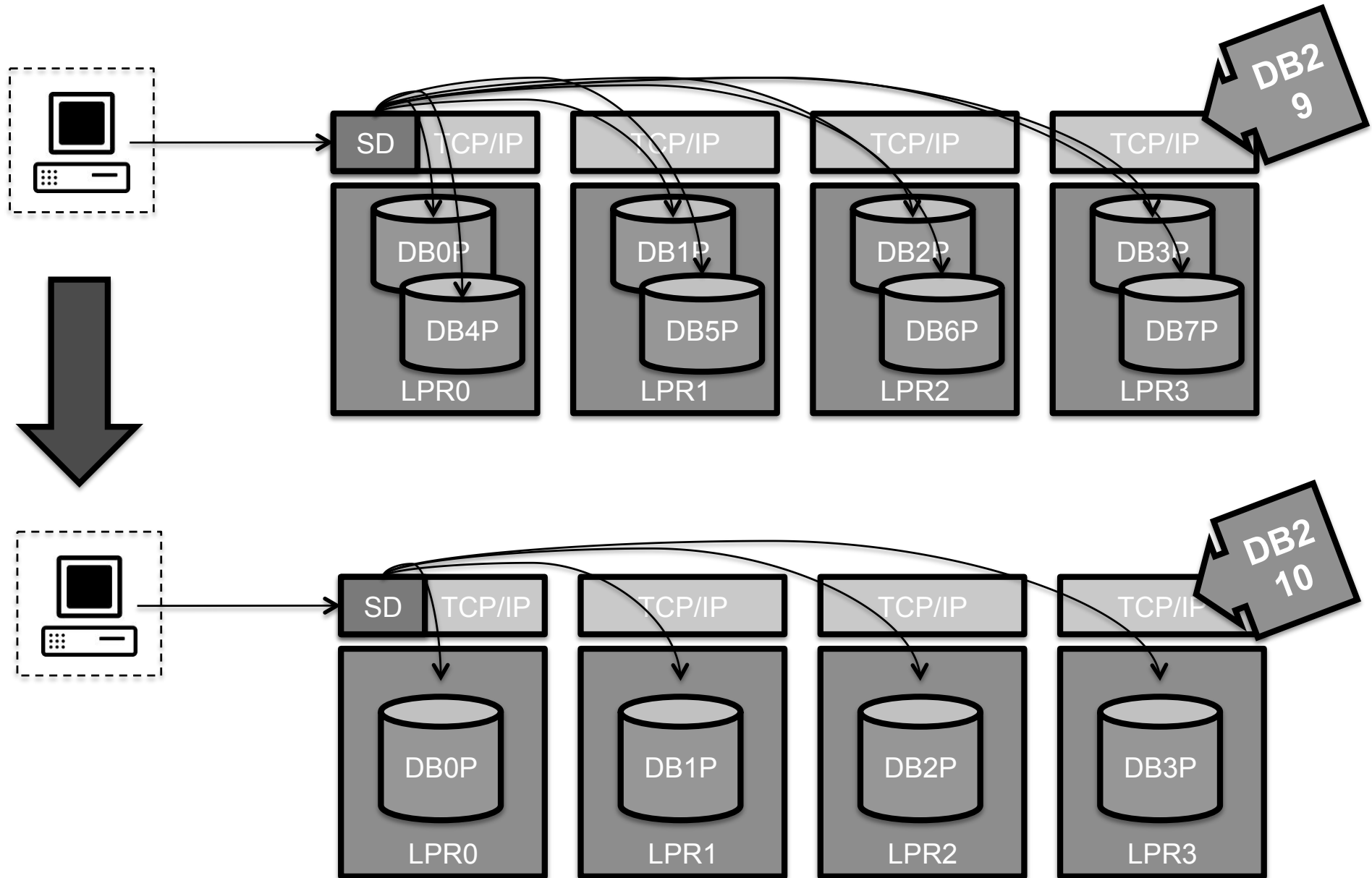
DB2 10 and specialty engines

IMPORTANT: DB2 10 EXTENDS the scope of the zIIP eligible workload

→ DB2 10 enhancements:

- – Offload 100 % of prefetch and deferred write engines
- – Offload 99 % of RUNSTATS CPU
- – DFSORT allows additional zIIP redirect for DB2 utilities.
- – Parsing process of XML schema validation:
  - • 100 percent of the new validation parser is eligible.
  - • Offload to zIIP, zAAP, or zAAP on zIIP.
- – zIIP eligibility for DRDA workloads is increased to 60 %
- – Certain DBM1 processes
- – Prefetch I/Os (reported as DBM1 SRB)
- – Deferred write I/Os (reported as DBM1 SRB)
- – Stored procedures written in SQL/PL

Estimating savings using PROJECTCPU

TIP: A zIIP processor is not required to evaluate its potential benefits
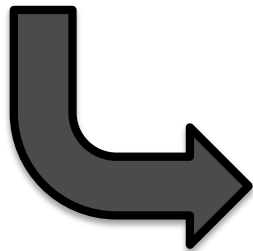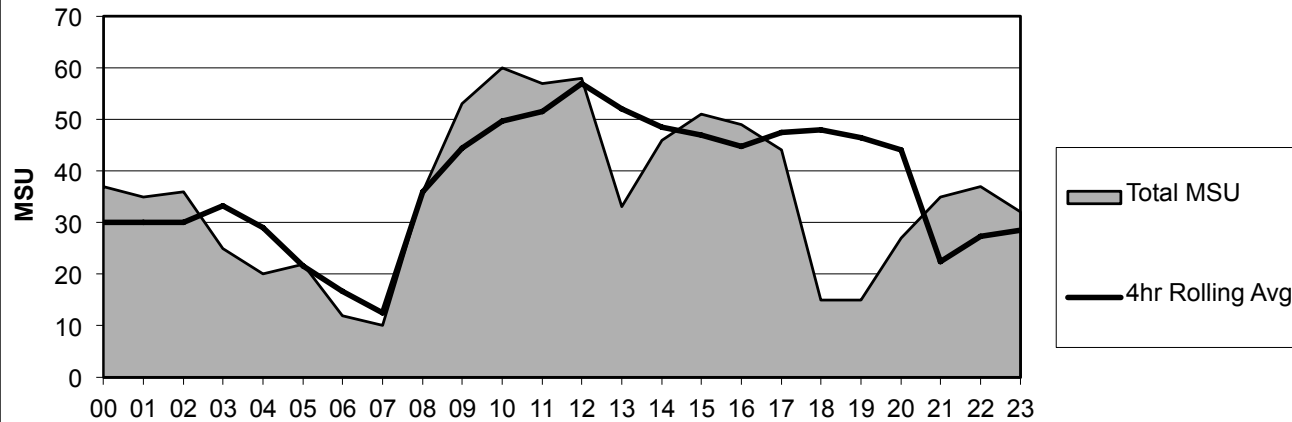
DWH CPU profile - day view

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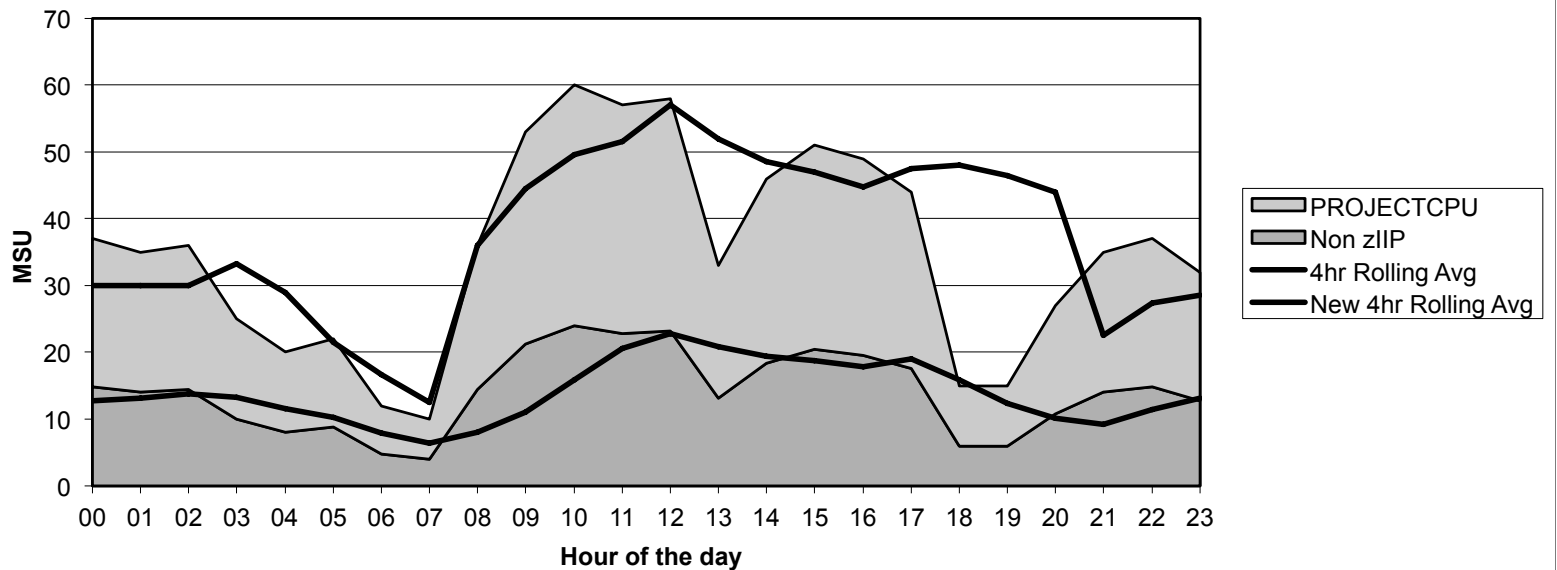
Summary & conclusions

→ We discussed
  - **WHY**…
  - … **HOW** & …
  - … **WHERE** Performance matters

→ A lot of excellent work has been done to optimize and improve DB2 10 performance
  - The performance benefits can be modelled

→ DB2 10 delivers value with
  - Immediate CPU savings after migration
  - Scalability improvements with up to 10 more concurrent users
  - The capabilities to improve the throughput of the most demanding applications

More reading material

THANKS!

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