Measuring the Amazing Performance of Db2 V12

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Session LE

Results summary

- About 3.000 MIPS saved by applications in the peak hour
- About 8.000 MIPS saved by applications in prime shift
- 4HRA peak moved from morning to evening
- About 700 MSU reduced in the 4HRA
- About 800 zIIP MIPS saved in DBM1
- Good improvements both in IMS transaction and queries response time
- All benefits out-of-the-box; no package rebind

Agenda

- Introduction
- CPU and zIIP consumptions of Db2 System AS
- CPU and zIIP consumptions of Db2 Applications
- Response time
- Where benefits come from?
- Summary

Introduction

Goal

- We will discuss the amazing benefits obtained migrating to Db2 V12
- Only in M100 at the time this presentation has been prepared

Customer

- Big customer (more than 50.000 MIPS; about 40.000 MIPS used by production systems in the peak hour; IBM z13 700 series)
- International scope
- Banking sector

SW levels

- z/OS 2.3
- IMS V15
- IIB 10
- MQ V9.0
- WebSphere 8.5.5
- Db2 V11 migrated to V12
  - ✓ Code Level: V12R1M503
  - ✓ Catalog Level: V12R1M500
  - ✓ Function Level: V12R1M100

Workload

- Most critical applications based on:
  - ✓ IMS/Db2 transactions
  - ✓ IIB/Db2 queries (IBM Integration Bus is now IBM ACE)
- Very high load in some hours in the prime shift (determining the SW costs)
- Slightly higher values in the peak hour which is the base for capacity planning

Measurements

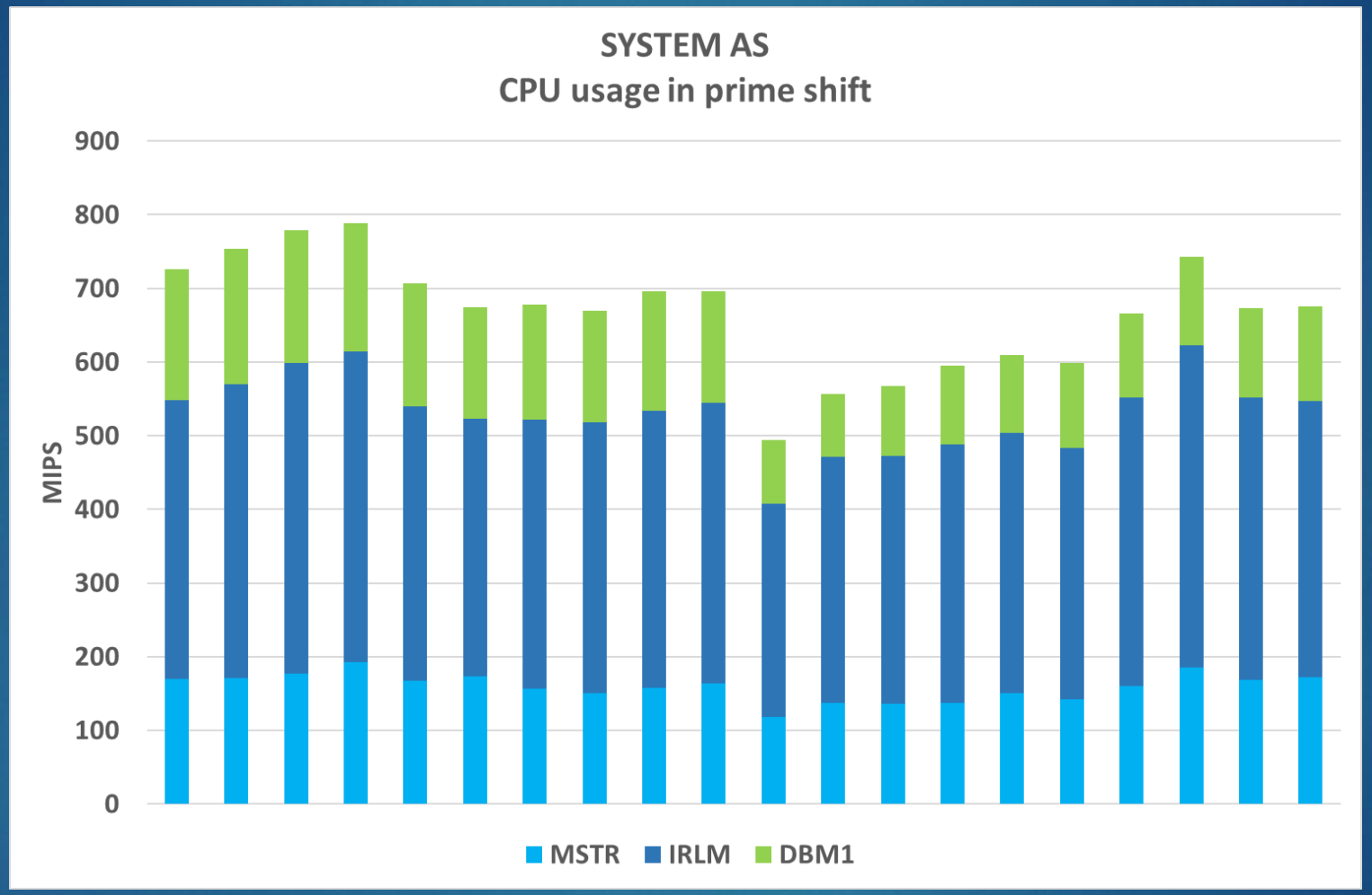
- SMF data used
  - ✓ SMF 30 for Db2 System AS CPU and zIIP
  - ✓ SMF 101 for Db2 Application CPU and zIIP (Class 2)
  - ✓ SMF 100 for statistics
- IMS log data for IMS transactions response time
- Application logs for IIB queries response time
- All the reports will compare two weeks before and after the migration

Tools

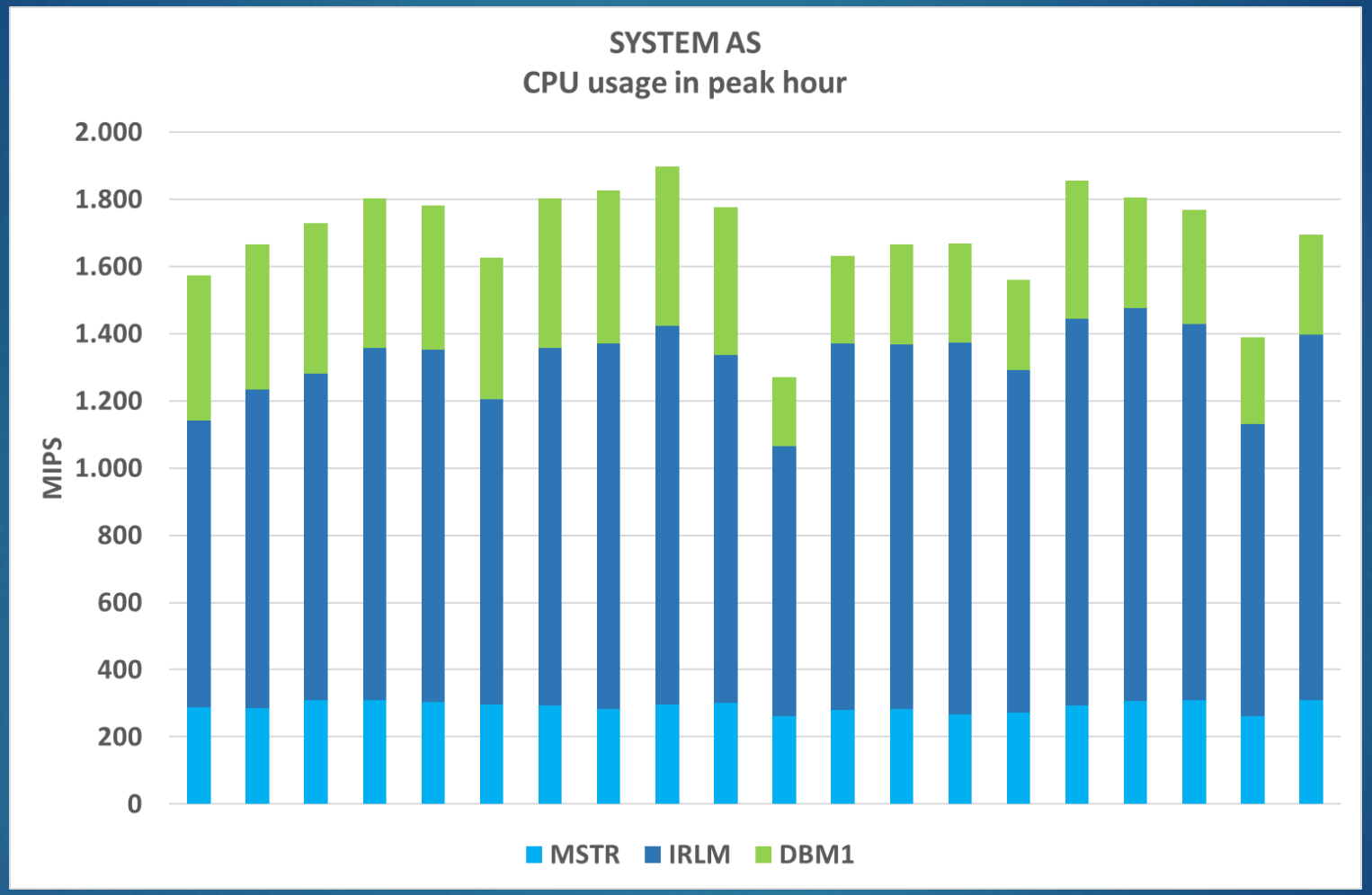
- EPV for Db2:
  - ✓ Reports about System AS CPU and zIIP
  - ✓ Reports about Db2 Application CPU and zIIP
  - ✓ Other Db2 reports
- EPV for z/OS
  - ✓ Reports about IMS transactions response time
- MyEPV
  - ✓ Reports about IIB queries response time

CPU and zIIP consumptions of Db2 System AS

System Address Space CPU



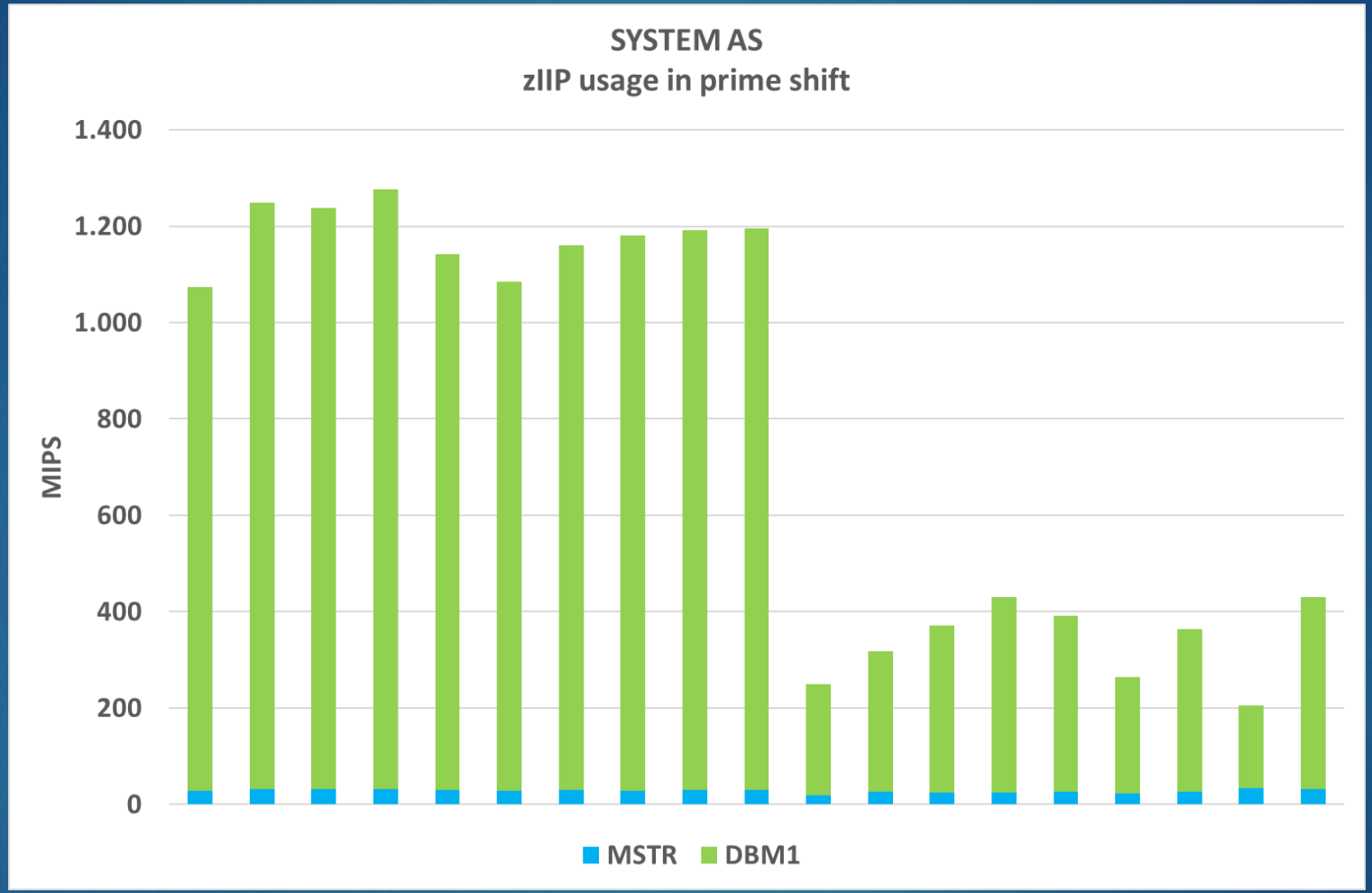
System Address Space CPU



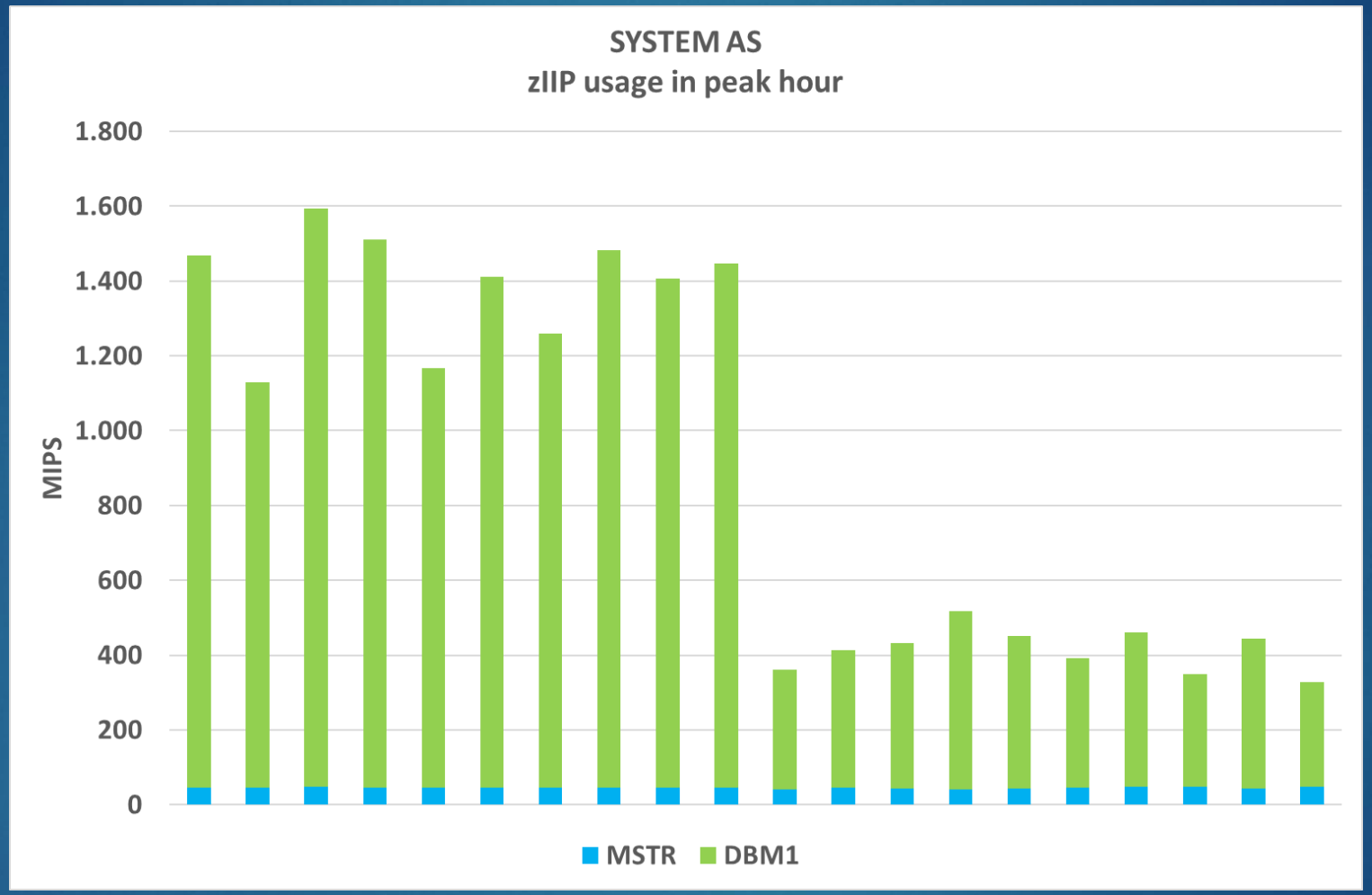
System Address Space CPU

- Slight reduction in DBM1
- No meaningful difference for IRLM and MSTR
- IRLM is the major consumer

System Address Space IIP



System Address Space IIP

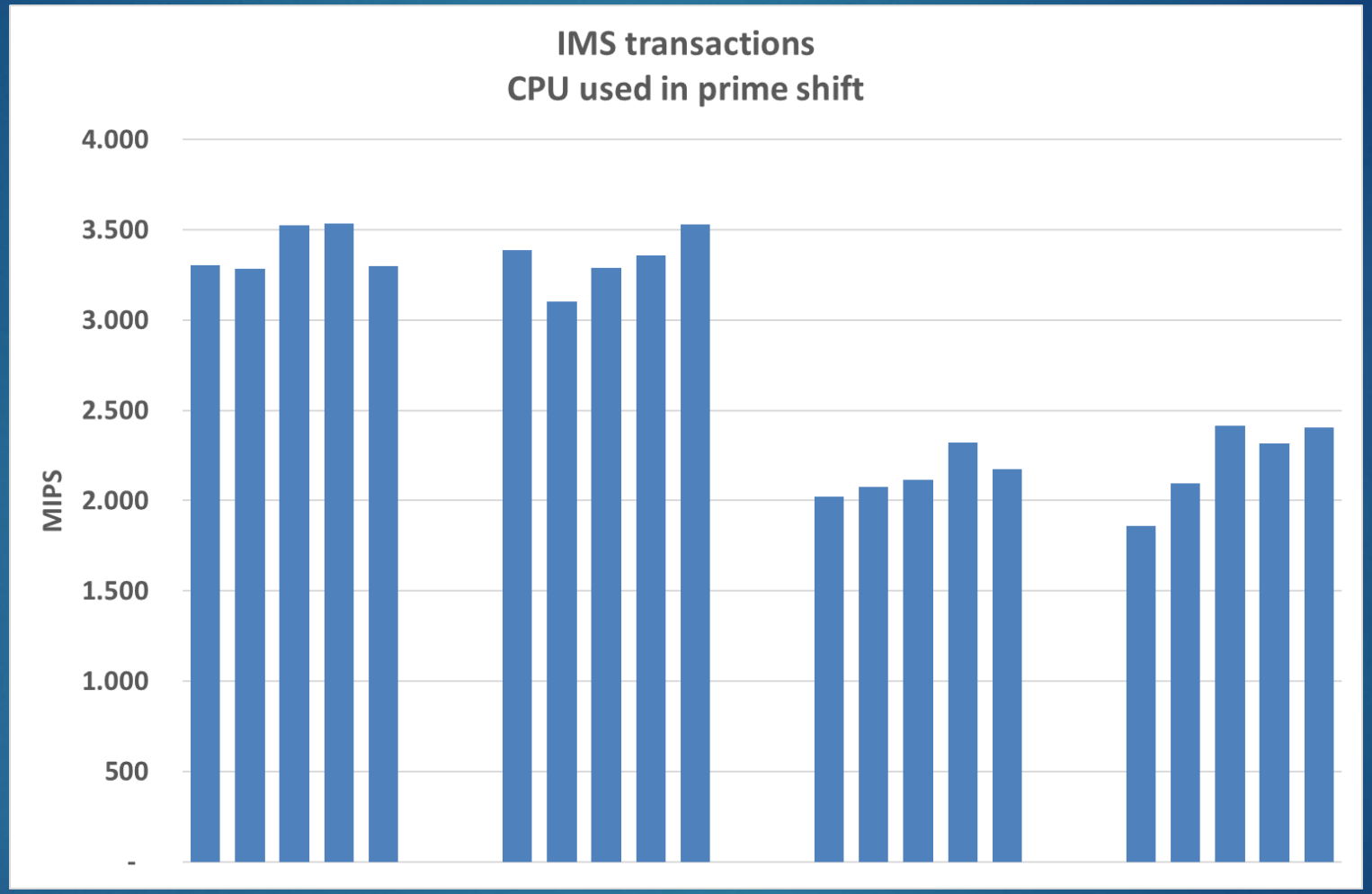


System Address Space IIP

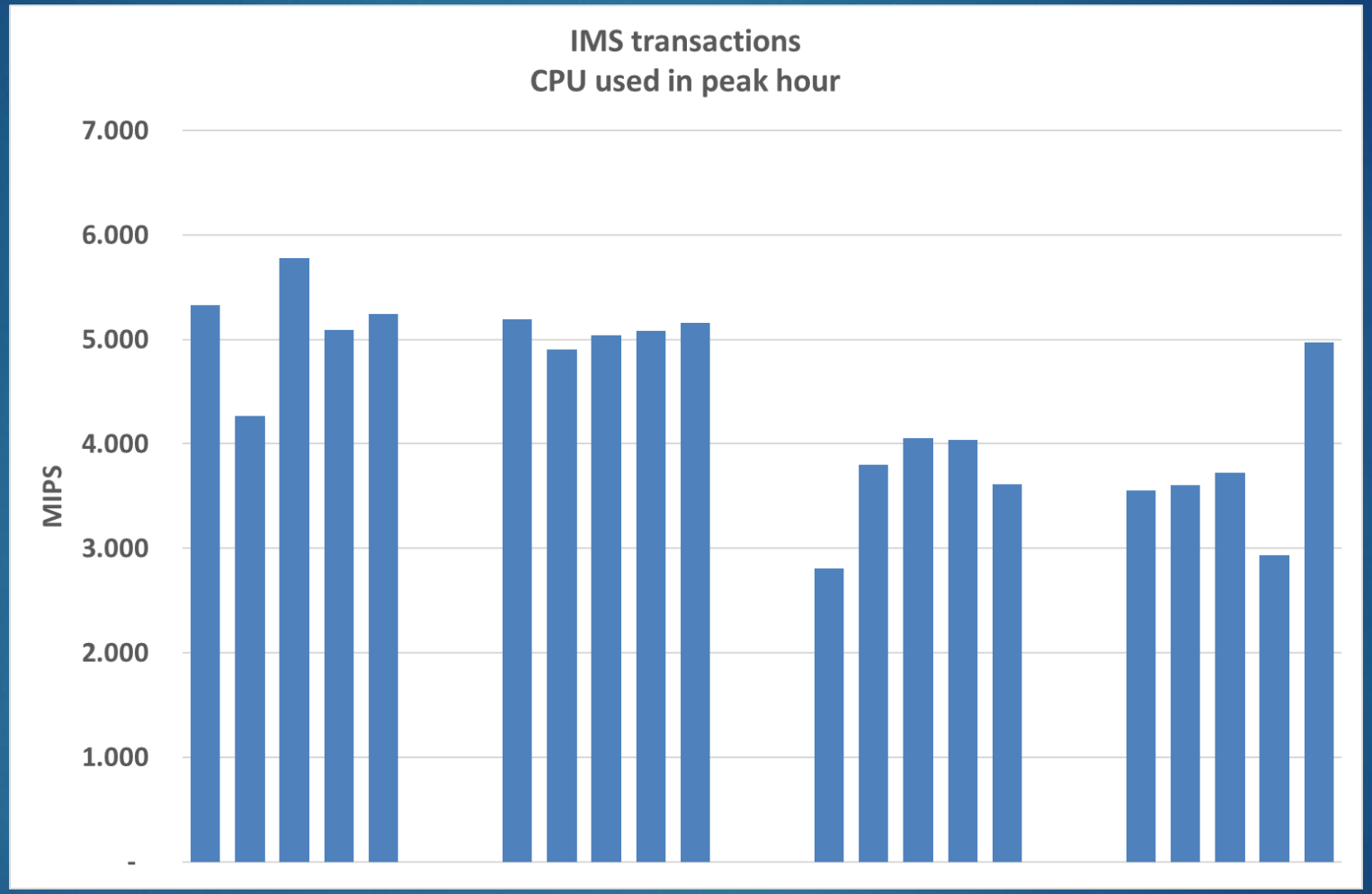
- Big reduction in DBM1
- No meaningful difference for MSTR
- IRLM is not using the zIIP at all

CPU and zIIP consumptions of Db2 Applications

IMS CPU consumptions



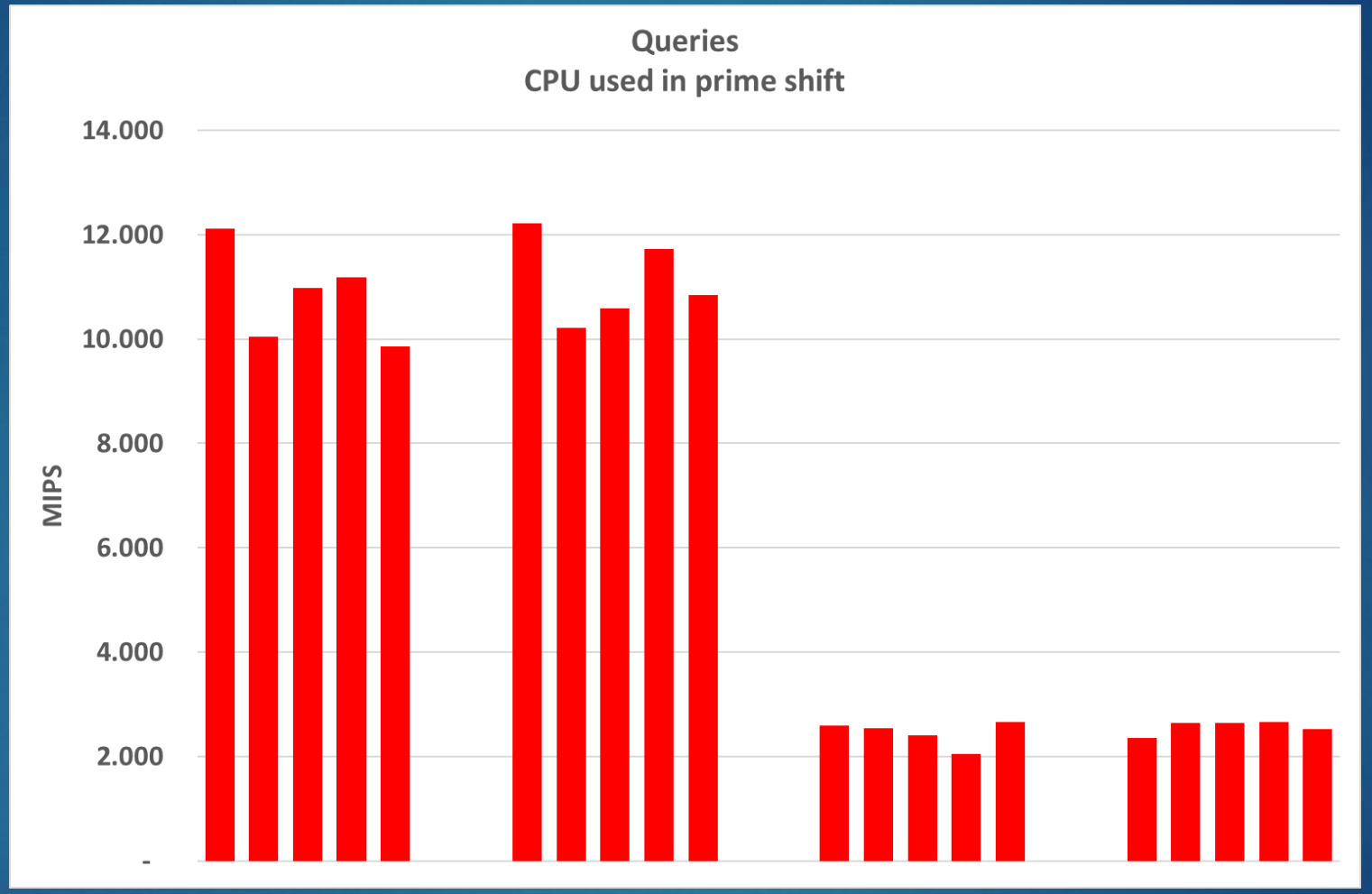
IMS CPU consumptions



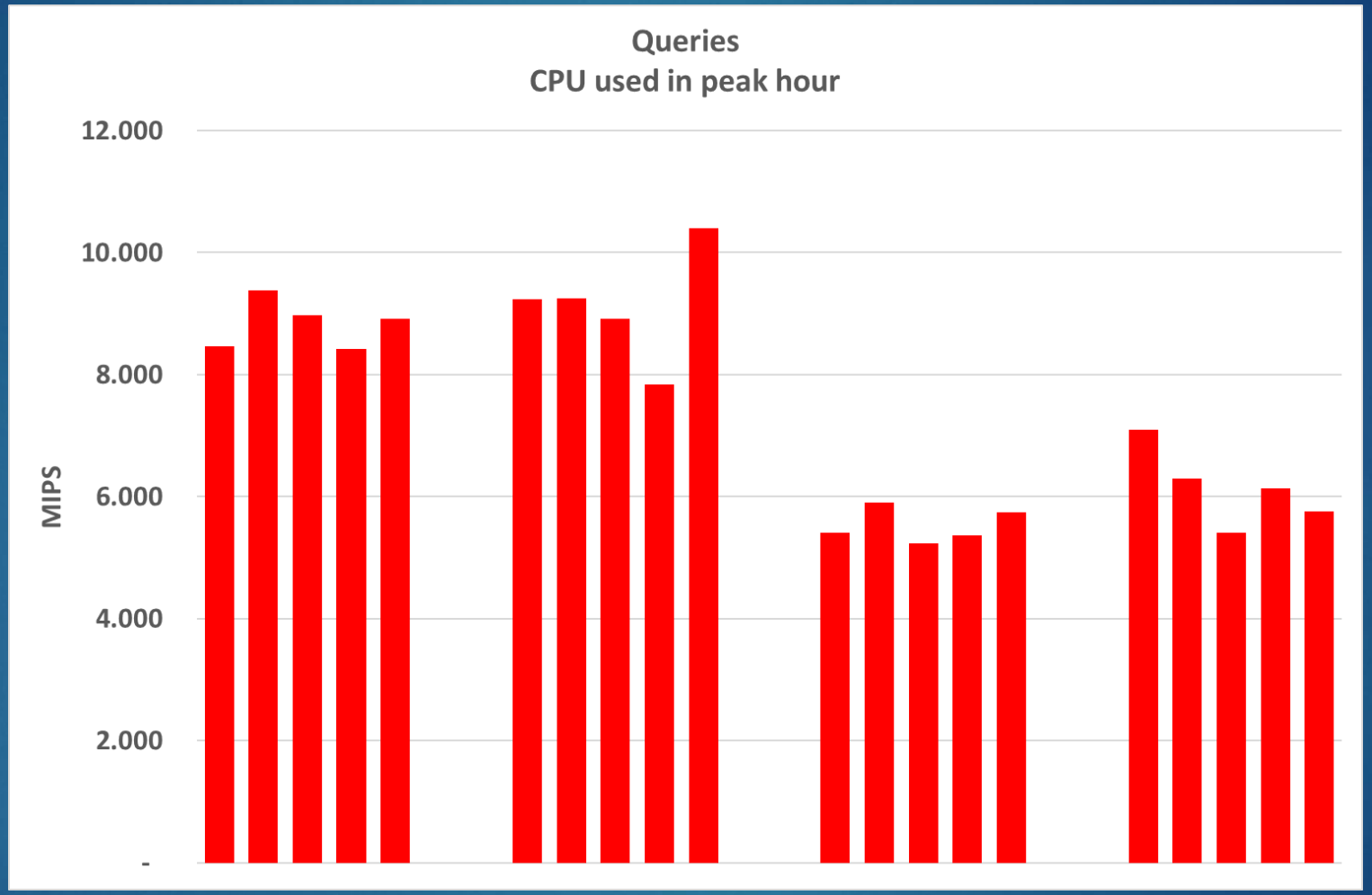
IMS CPU consumptions

- About 1.000 MIPS reduced in both prime shift and peak hour
- Anomaly on last Friday or simply a workload peak?

Queries CPU consumptions



Queries CPU consumptions

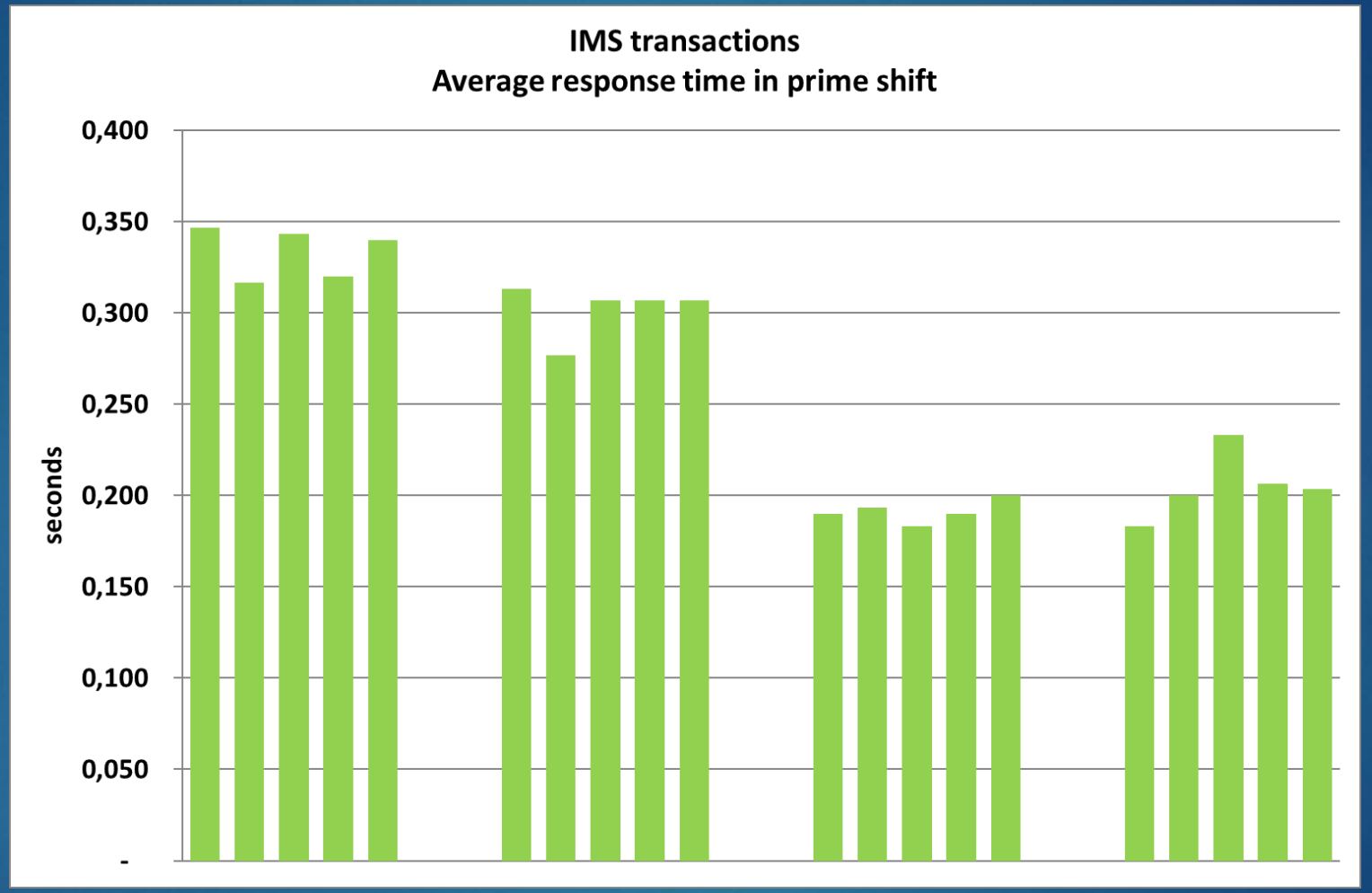


Queries CPU consumptions

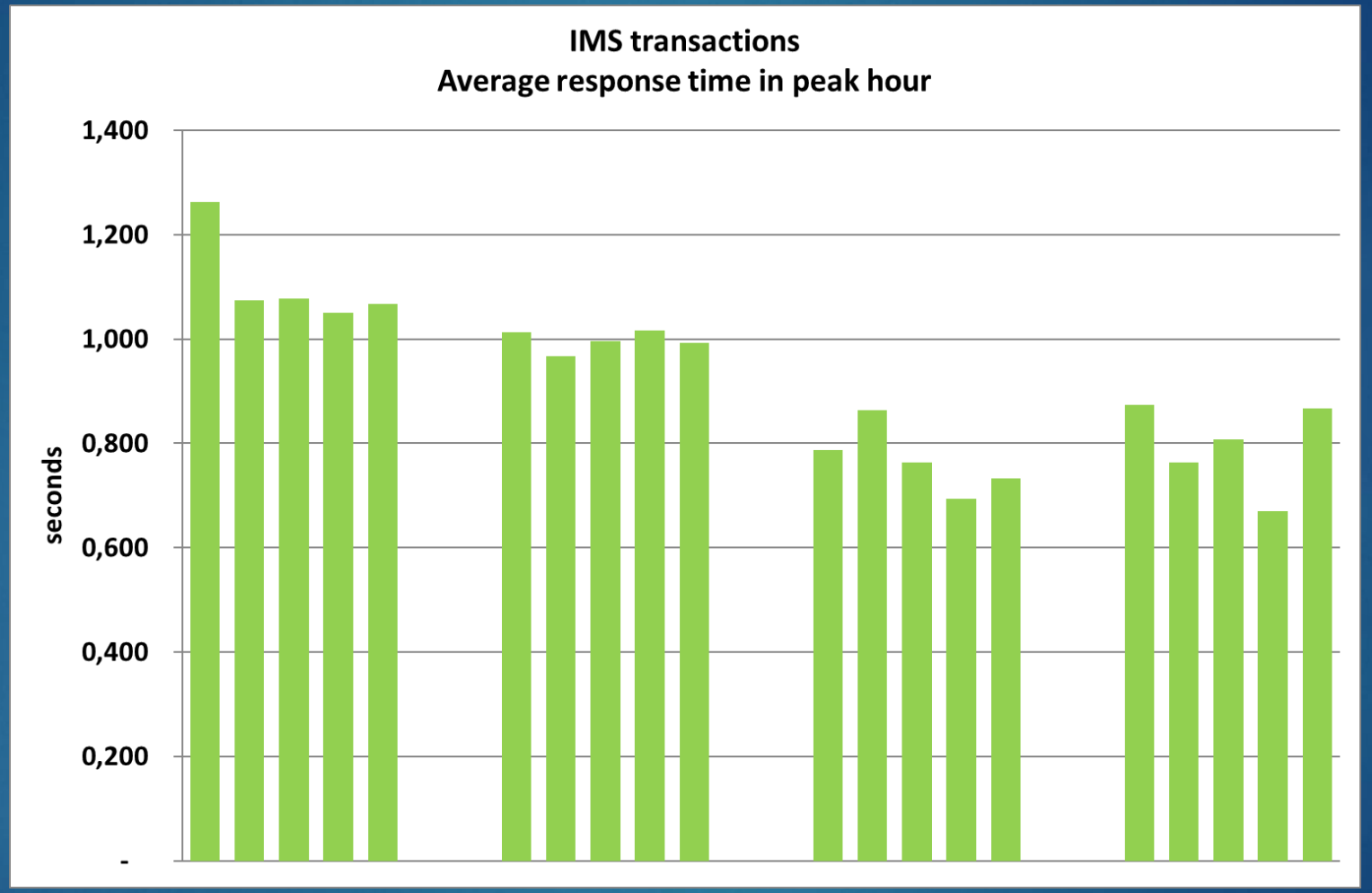
- More than 8.000 MIPS reduced in prime shift
- About 3.000 MIPS reduced in peak hour

Response time

Response time – IMS transactions



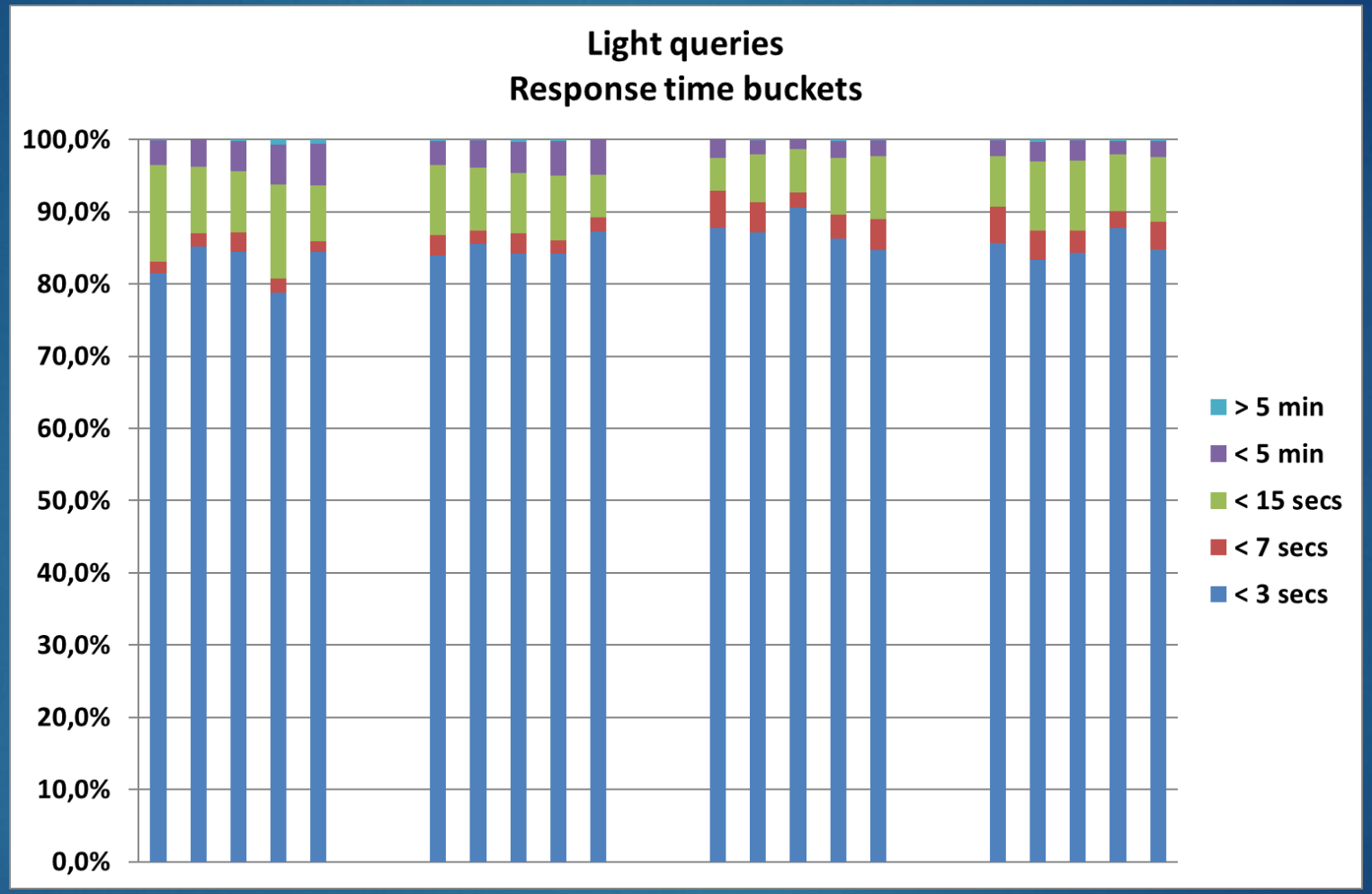
Response time – IMS transactions



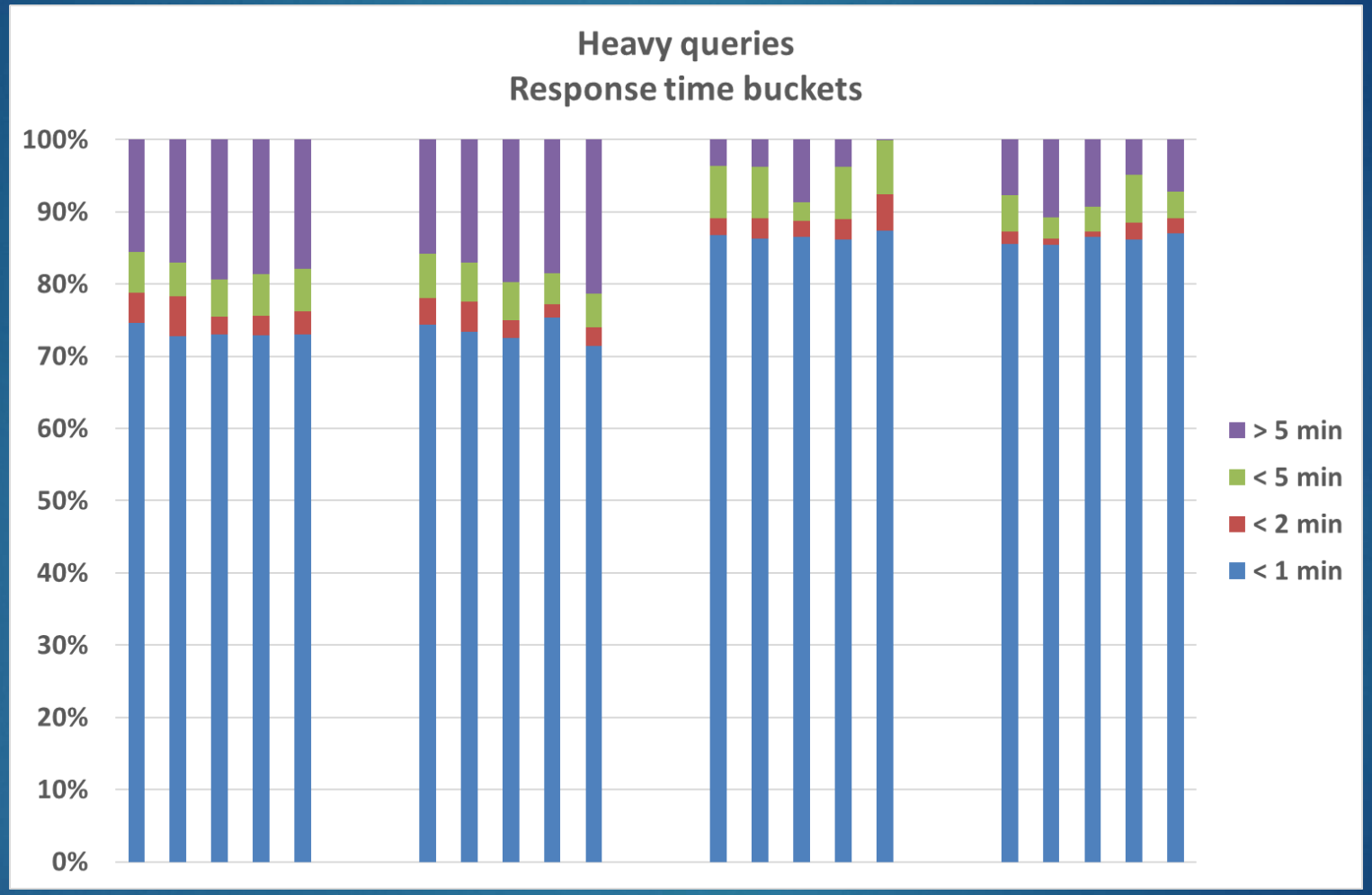
Response time – IMS transactions

- Big average across all the IMS transactions
- About 33% response time reduction in prime shift
- About 20% response time reduction in peak hour

Response time – Light queries



Response time – Heavy queries



Response time – Queries

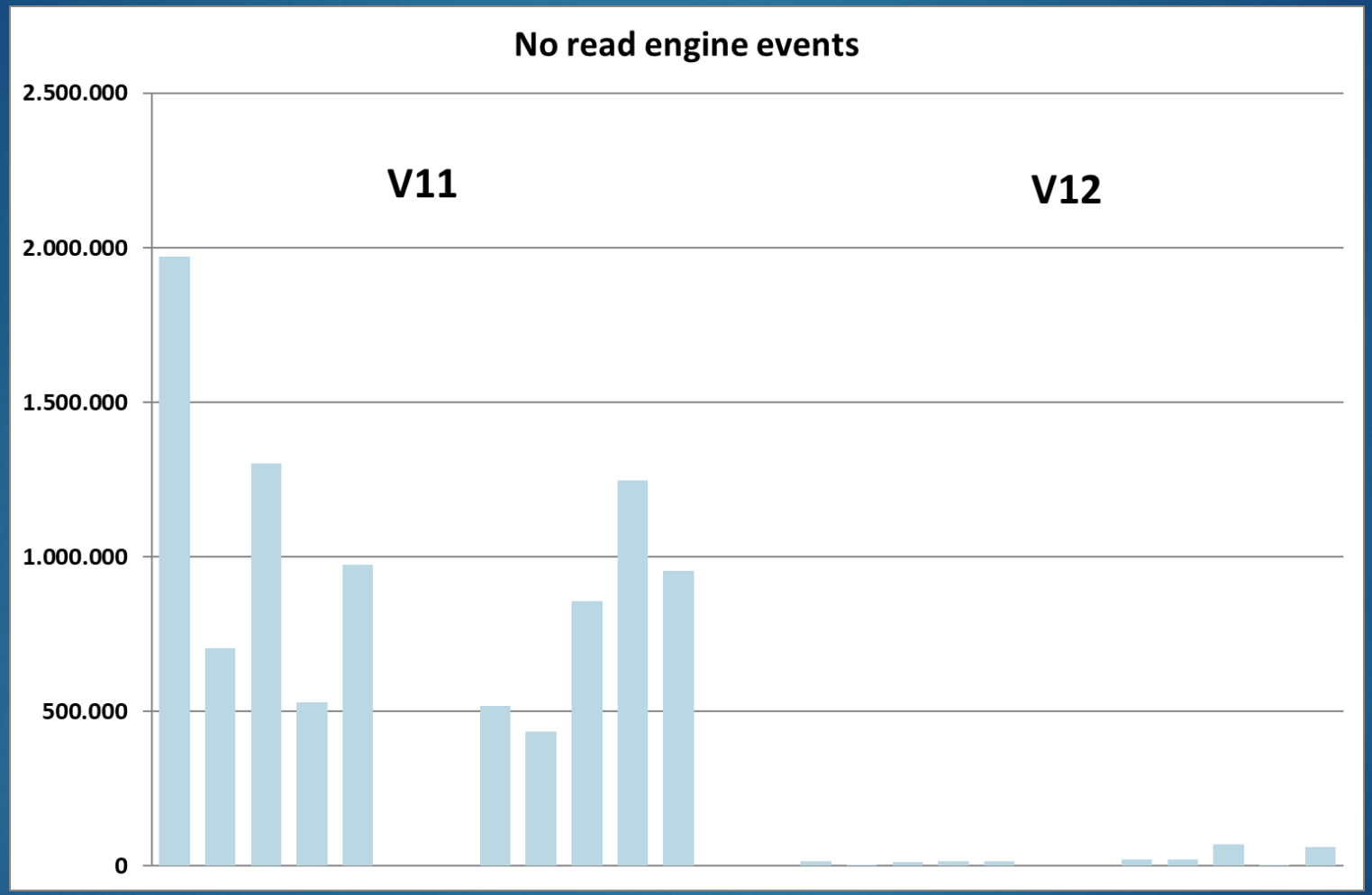
- Slight performance improvement for light queries
- More benefits for heavy queries
- About 10% more heavy queries completed in less than 1 minute

Where benefits come from?

Prefetch enhancements

- Db2 12 greatly enhanced dynamic prefetch to avoid prefetch scheduling when the pages are determined to be in the buffer pool
- In addition Db2 12 provides 900 prefetch engines (300 more than in Db2 11)

Prefetch - Engines

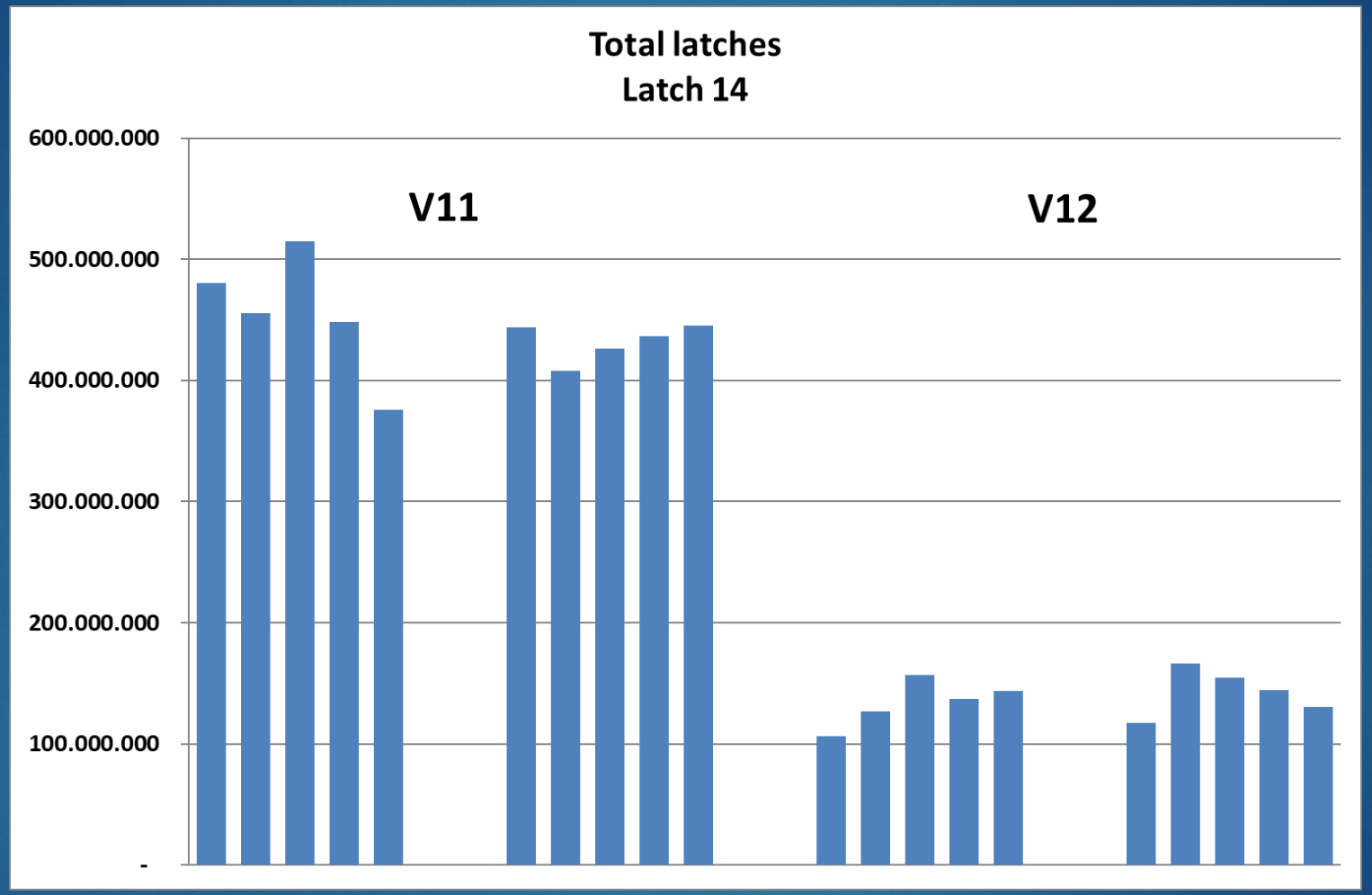


Latch contention relief

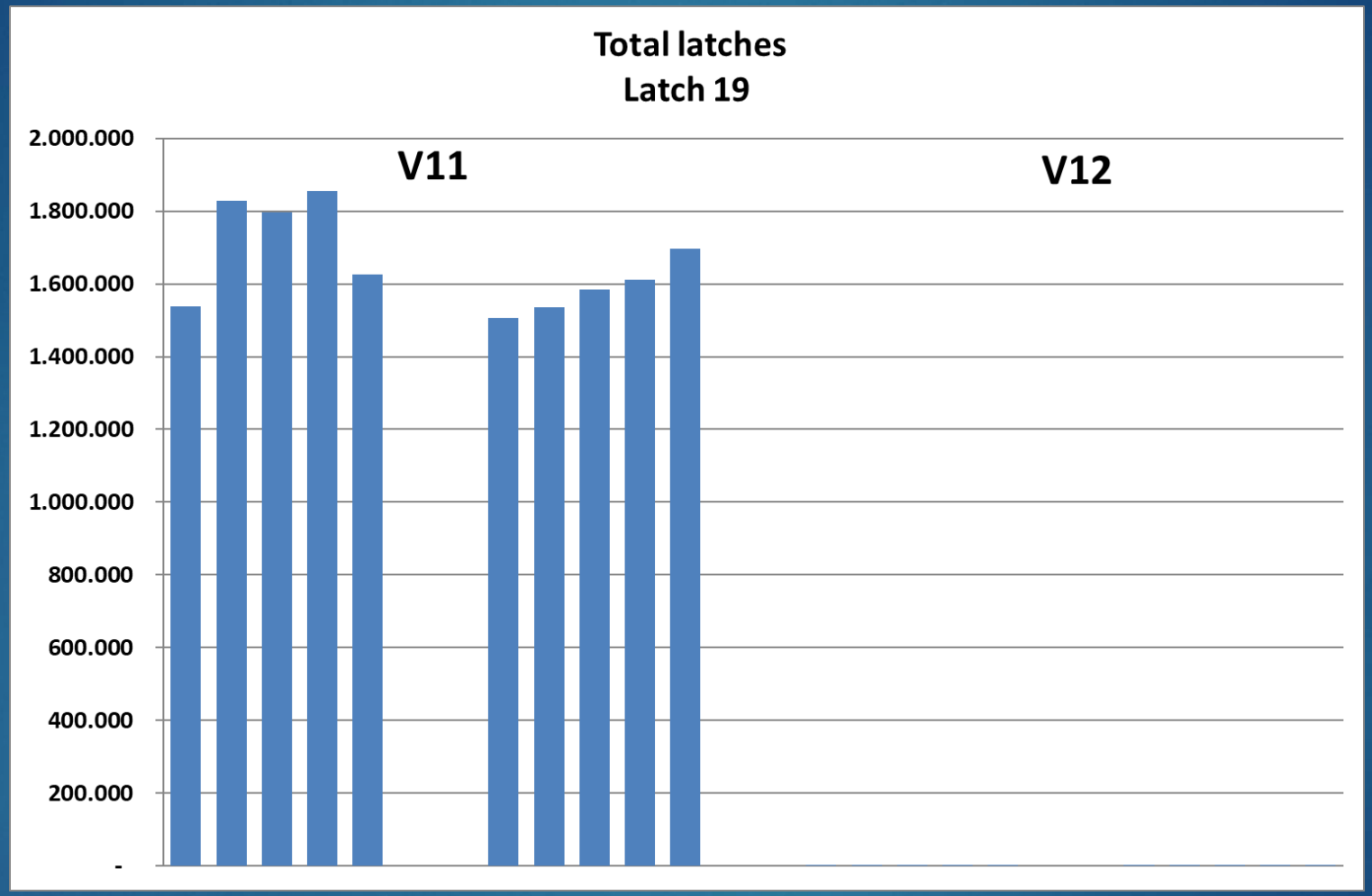
- Db2 12 provides internal latch contention relief to the following latch contention classes(*):
  - ✓ LC14 buffer manager latch
  - ✓ LC19 log latch
  - ✓ LC23 page latch timer
  - ✓ LC24 EDM latch

(*) from IBM Db2 12 for z/OS Technical Overview

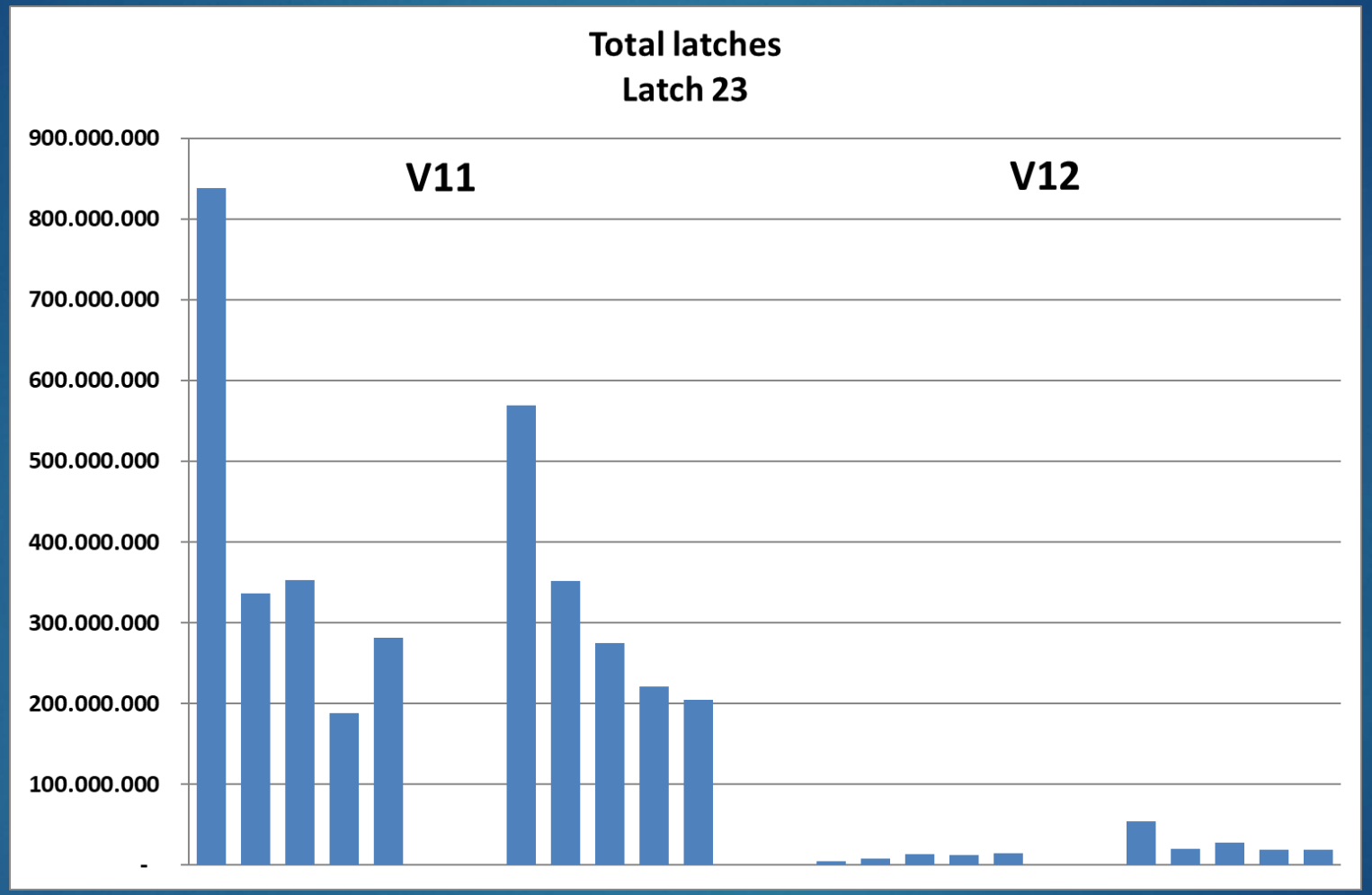
Latch14 – Buffer manager (BM)



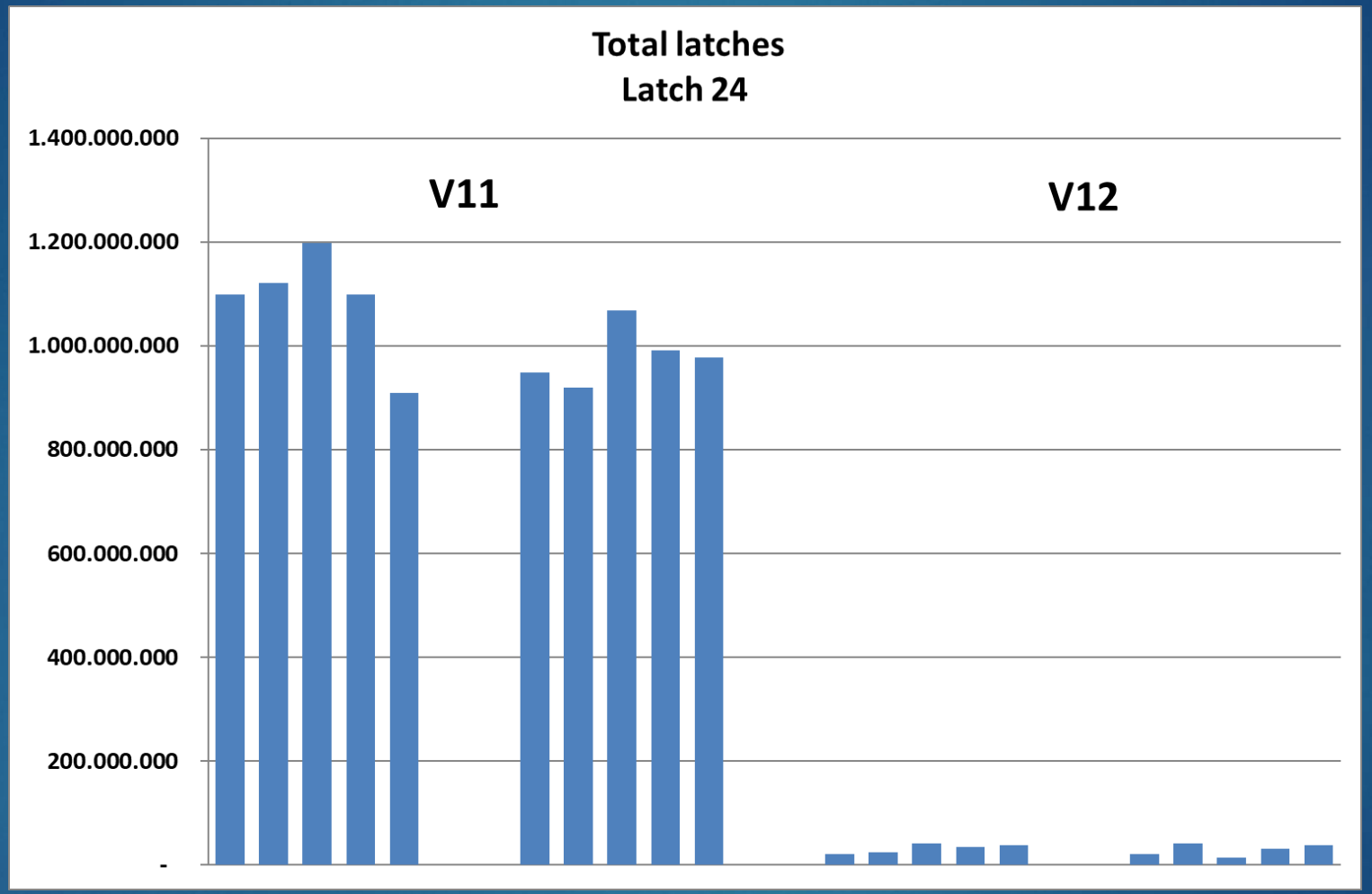
Latch19 – Log


Total latches
Latch 19
2.000.000
1.800.000
1.600.000
1.400.000
1.200.000
1.000.000
800.000
600.000
400.000
200.000
-
V11
V12

Latch23 – Page latch contention



Latch24 – EDM or prefetch

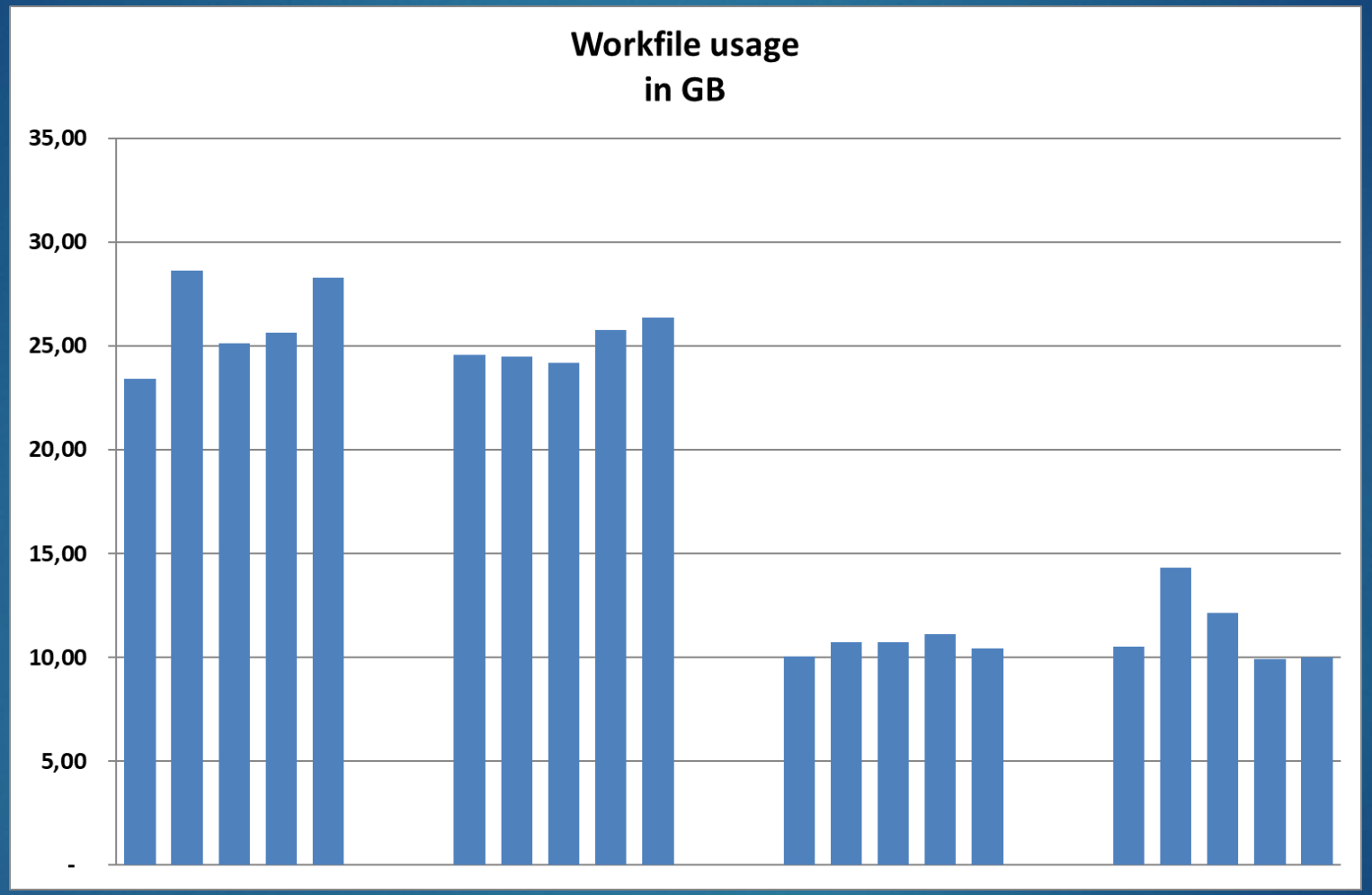


Query materialization

- In Db2 12, materialization to a workfile is minimized, trimming unnecessary columns from the materialization, pushing predicates down to lower query blocks, pushing down the ordering of data and fetching first counters into lower query blocks, and reordering outer join tables to avoid materialization (*).

(*) from IBM Db2 12 for z/OS Technical Overview

Query materialization



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Summary

Success is never final,
failure is never fatal,
it's courage that counts.

Questions ?