



OpenVMS Alpha and IPF Performance Comparison

Session 4033



Gregory Jordan
OpenVMS Engineering
Hewlett-Packard

© 2004 Hewlett-Packard Development Company, L.P.
The information contained herein is subject to change without notice



Overview

- The purpose of this presentation is to provide you with appropriate expectations of the performance of OpenVMS on Integrity platforms.
- The performance of various Integrity platforms will be compared with a variety of current Alpha platforms.



“We will port OpenVMS to the IA64 architecture and ship a production quality release in 2004.”

June 25th, 2001

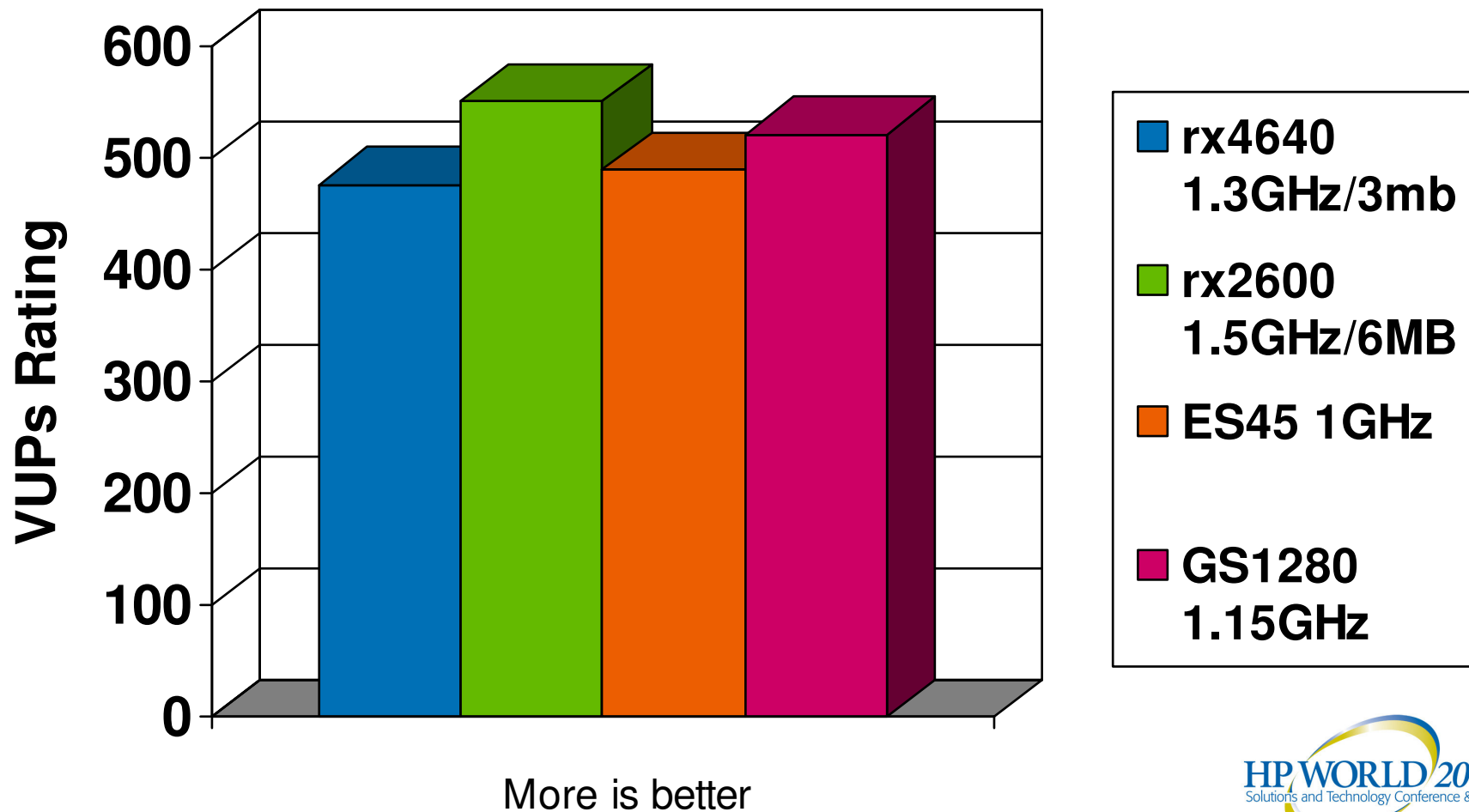


IPF/Alpha Performance Comparison

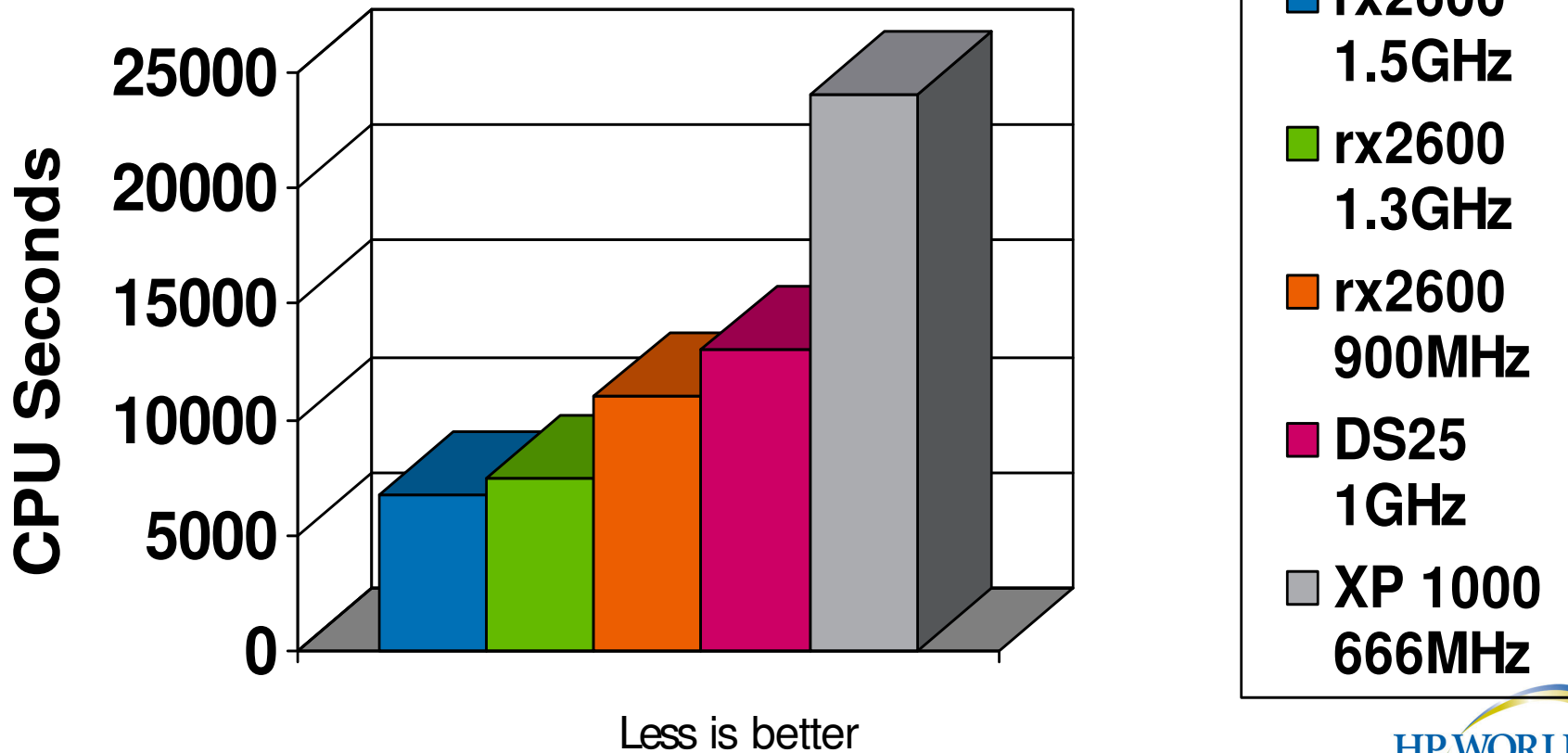
- The Basics
 - CPU
 - Memory
 - IO
- OpenVMS Operating System Performance
- Various Improvement Successes
- Performance Conclusions

CPU – VUPS test program

VUPS test program - Integer Computations

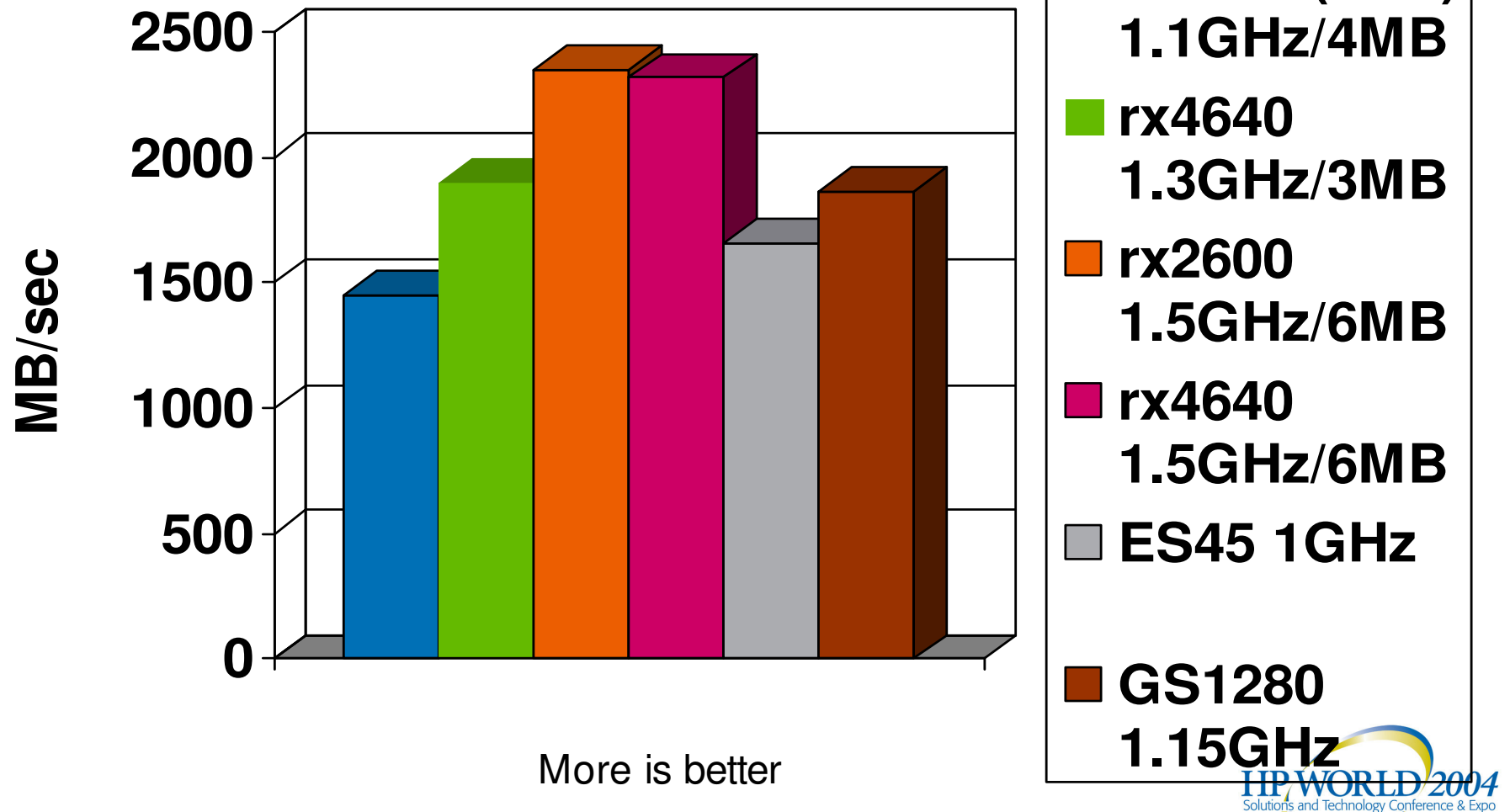


Time to Process a Work Unit

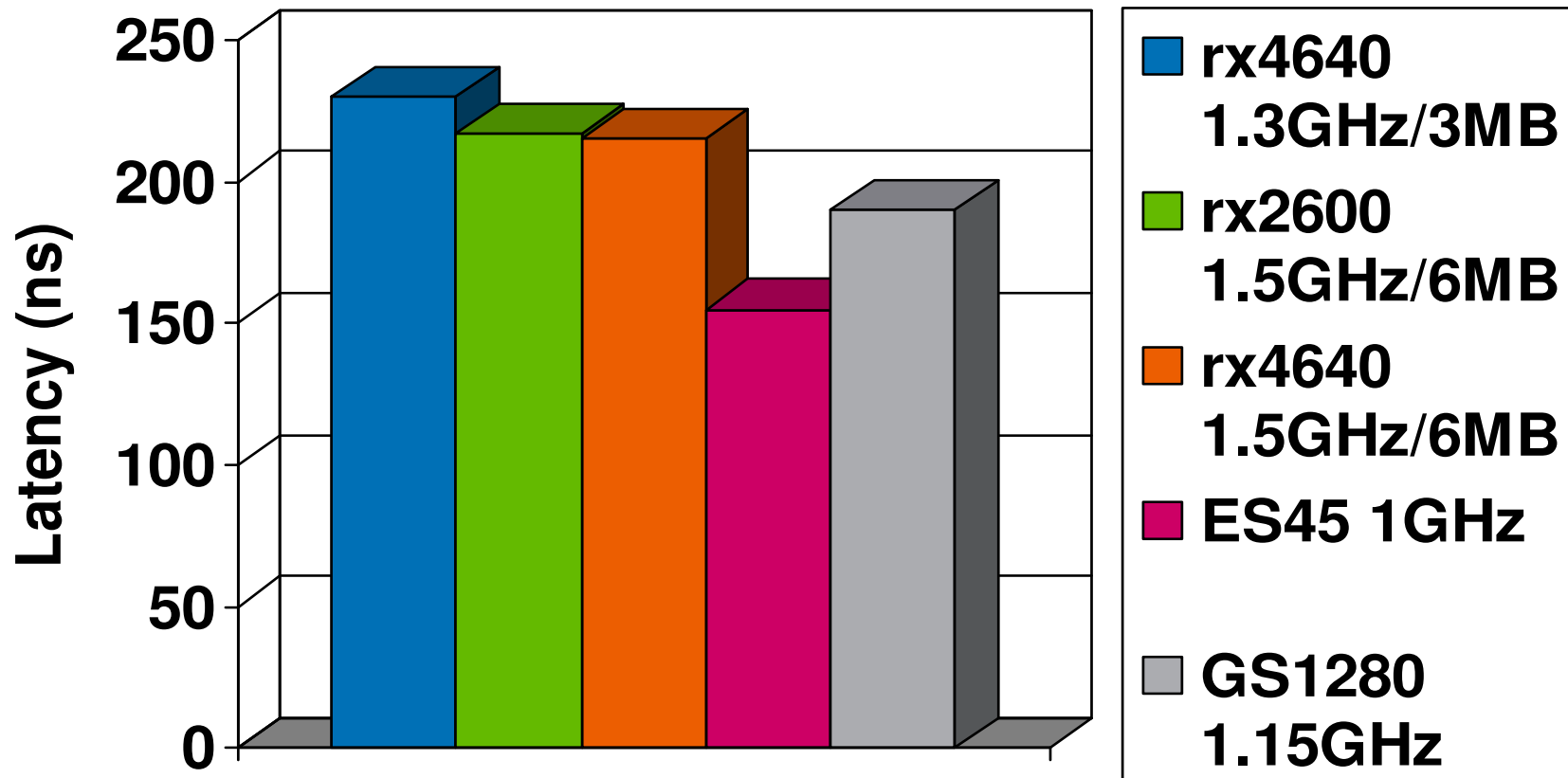


Memory Bandwidth

- MEMSpeed – Test Program



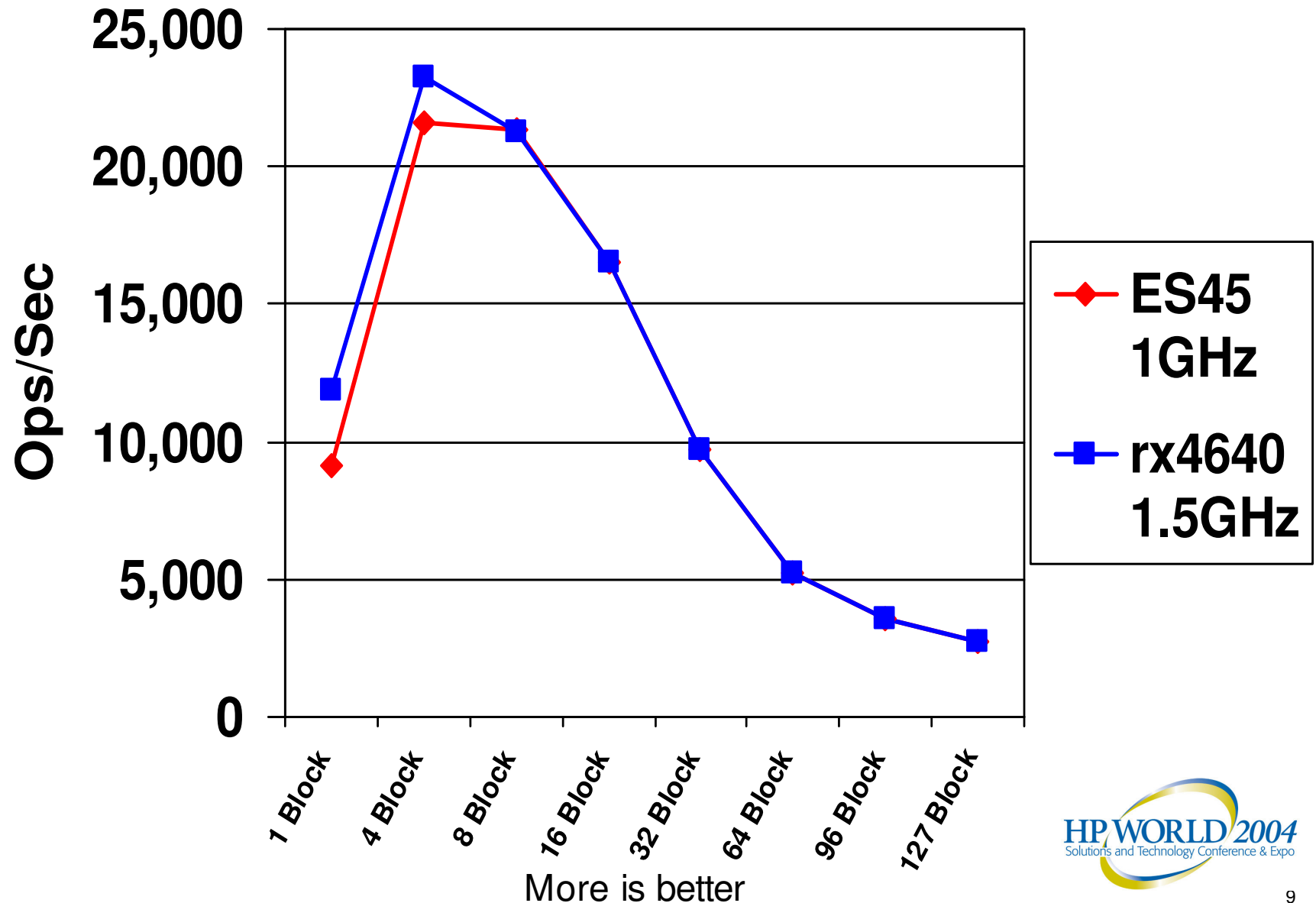
Memory Latency



Less is better

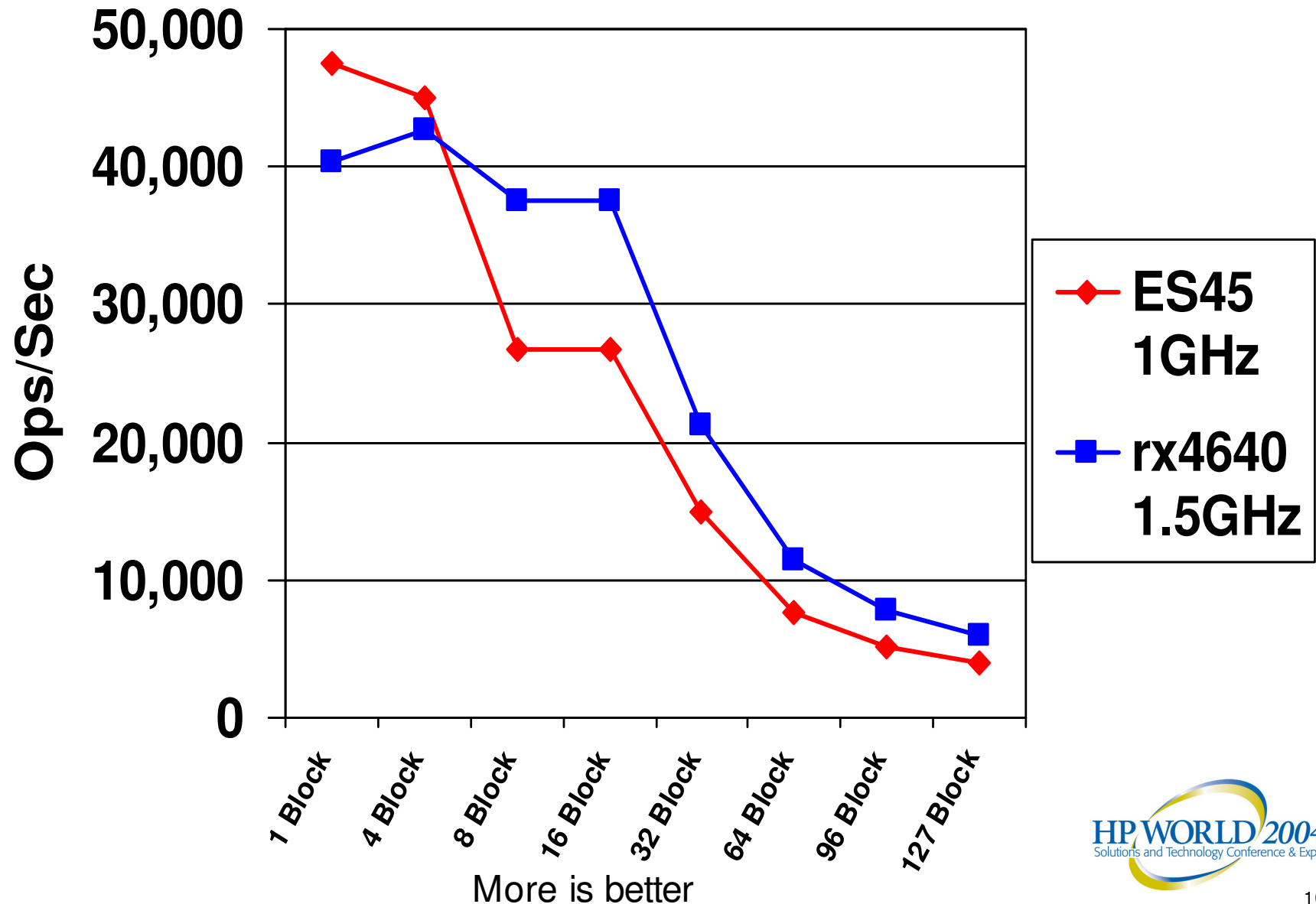
IO Performance – single process

(QLogic ISP23xx) 2Gigabit Fiber Channel Card



IO Performance – two processes

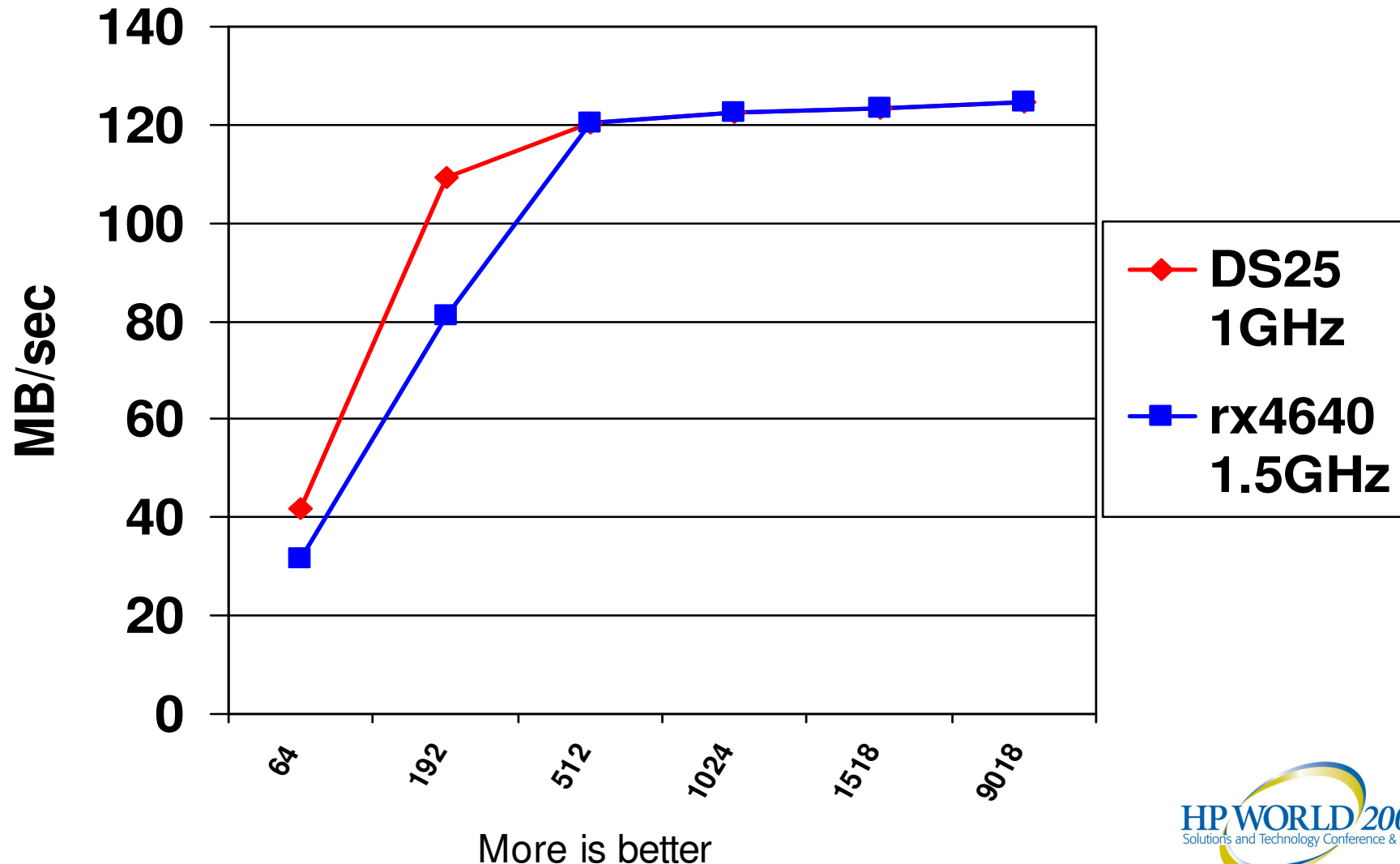
(QLogic ISP23xx) 2Gigabit Fiber Channel Card



Gigabit Transmit MBytes/Sec

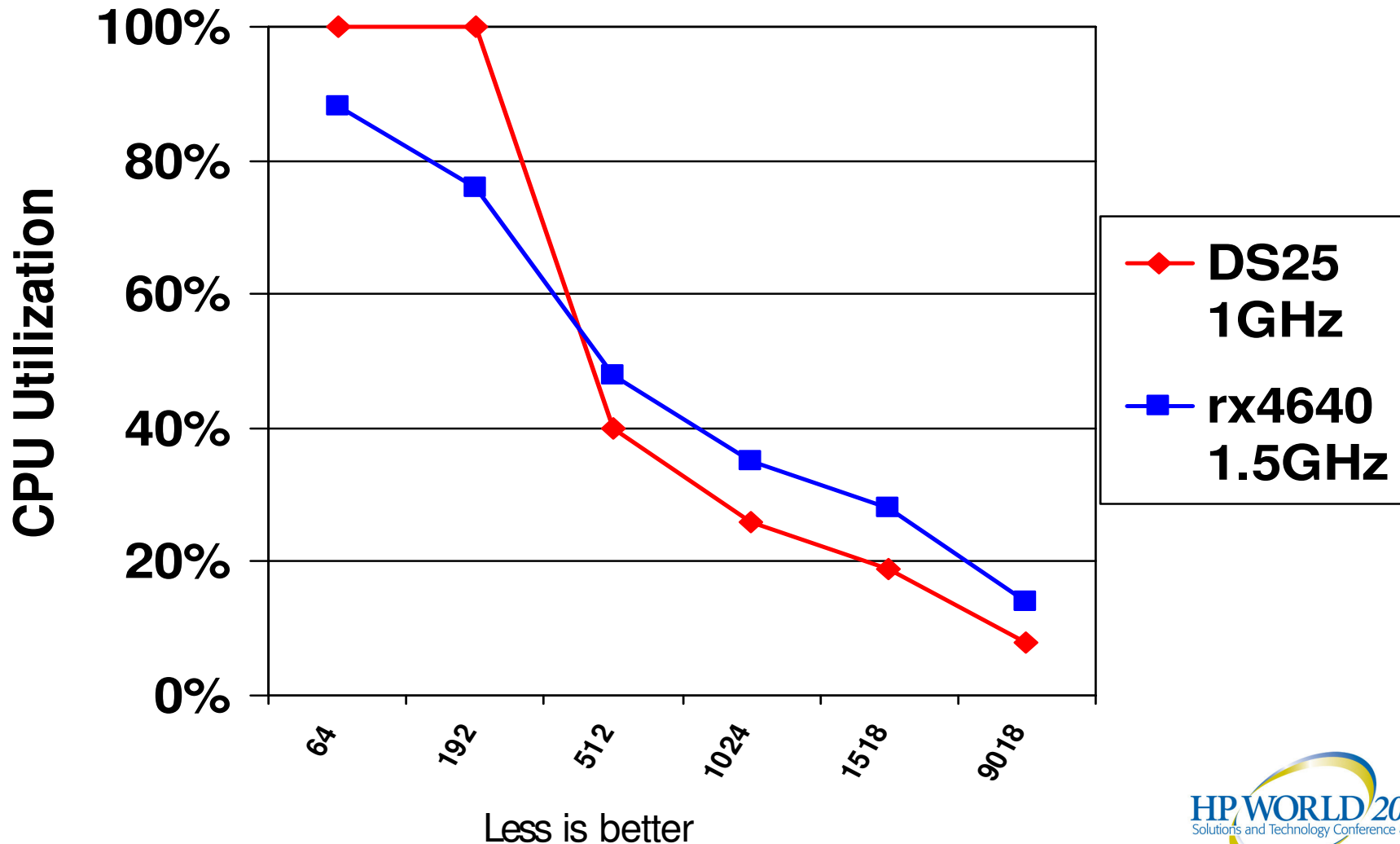
rx4640 1.3GHz (A6825A - Broadcom 5701) in 64-bit PCI @ 66 mhz

DS25 1GHz (DEGXA - Broadcom 5703) in 64-bit PCI @ 66 mhz



Gigabit Transmit CPU Utilization

rx4640 1.3GHZ (A6825A - Broadcom 5701) in 64-bit PCI @ 66 mhz
DS25 1GHz (DEGXA - Broadcom 5703) in 64-bit PCI @ 66 mhz



Gigabit Transmit/Receive MBytes/Sec

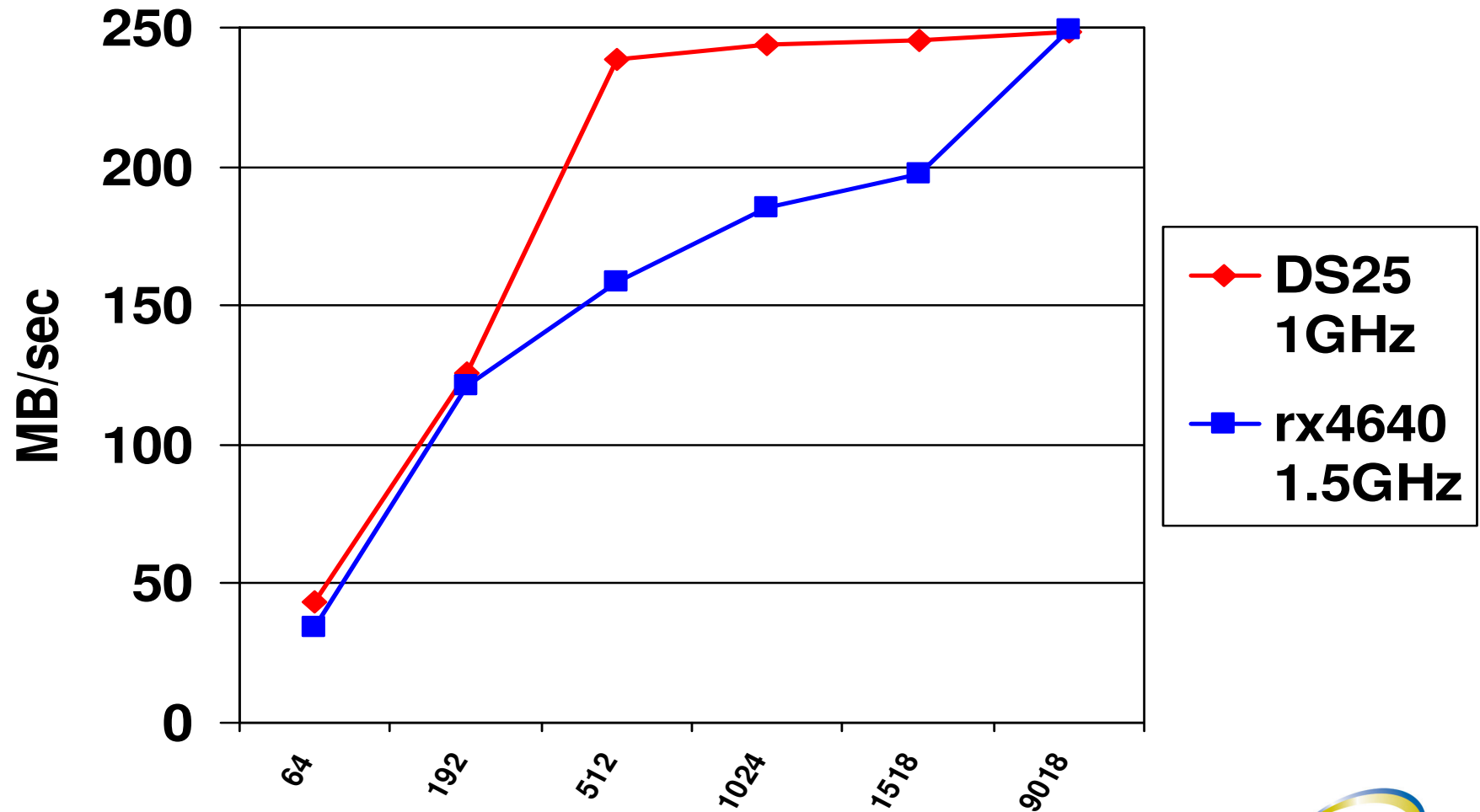
rx4640 1.3GHz (A6825A - Broadcom 5701) in 64-bit PCI @ 66

mhZ

DS25 1GHz (DEGXA - Broadcom 5703) in 64-bit PCI @ 66 mhZ



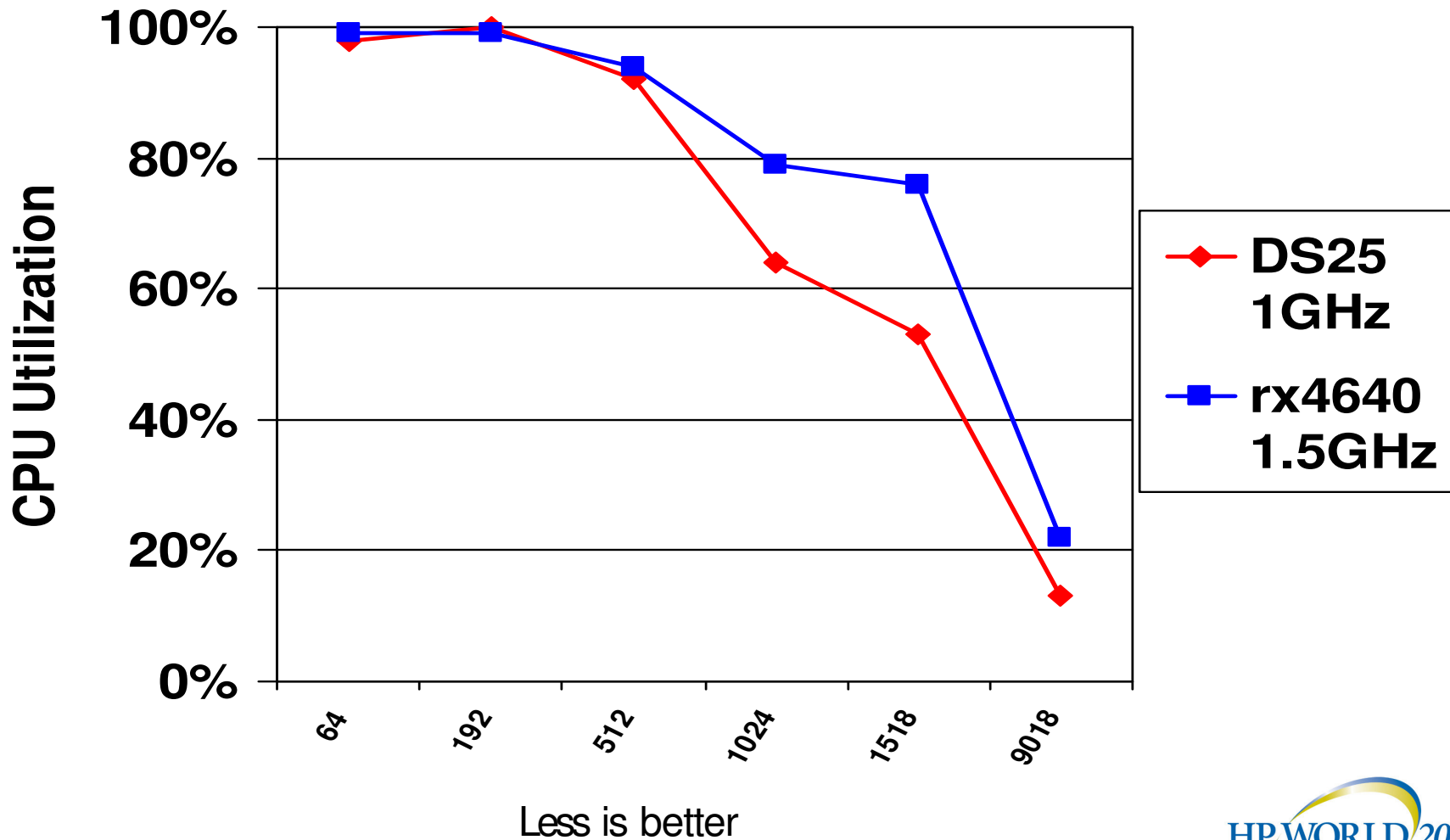
1 CPU Active



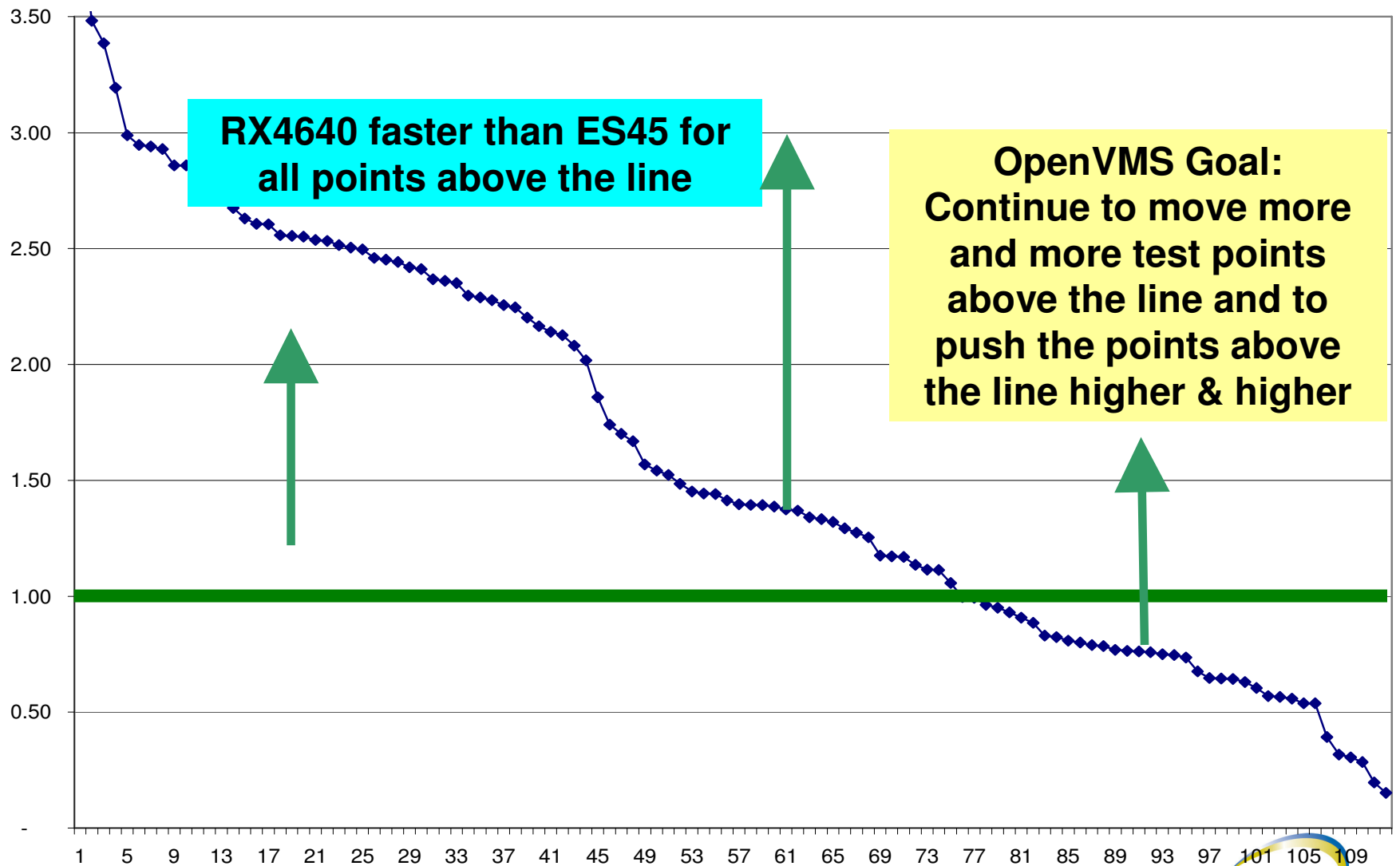
More is better

Gigabit Transmit/Receive CPU Utilization

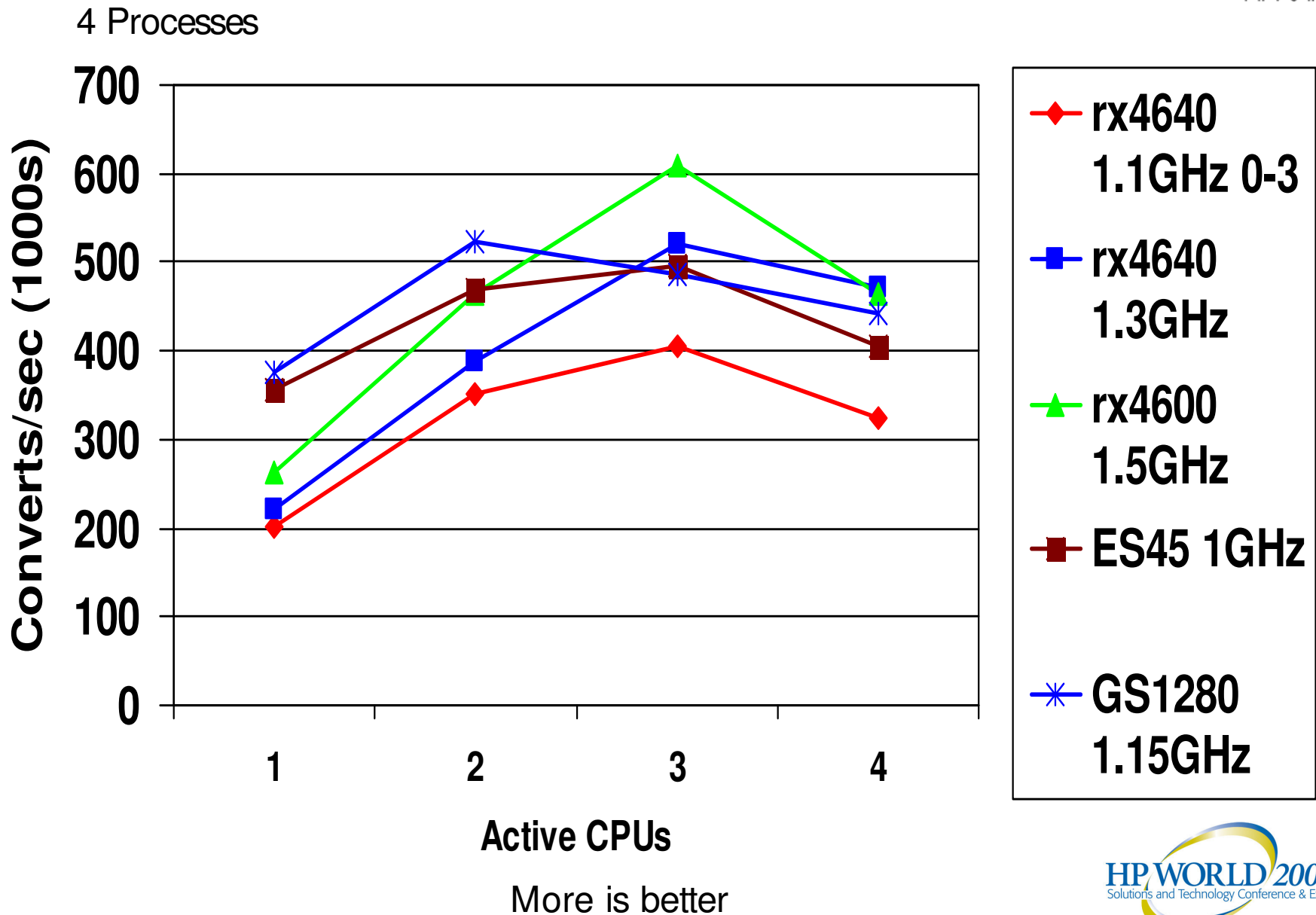
rx4640 1.3GHz (A6825A - Broadcom 5701) in 64-bit PCI @ 66 mhz
DS25 1GHz (DEGXA - Broadcom 5703) in 64-bit PCI @ 66 mhz



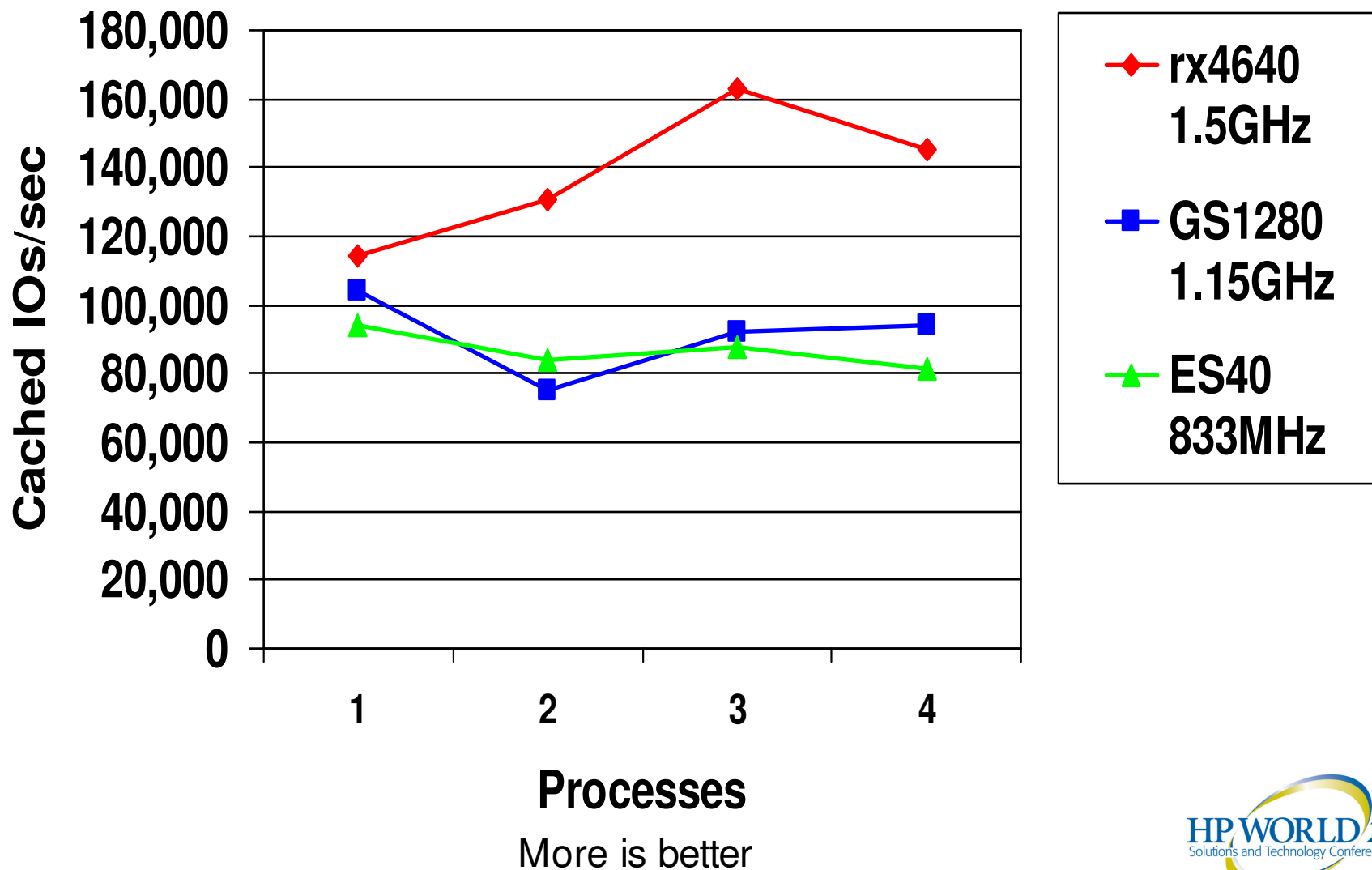
System Services – X8.2 vs. 7.3-2



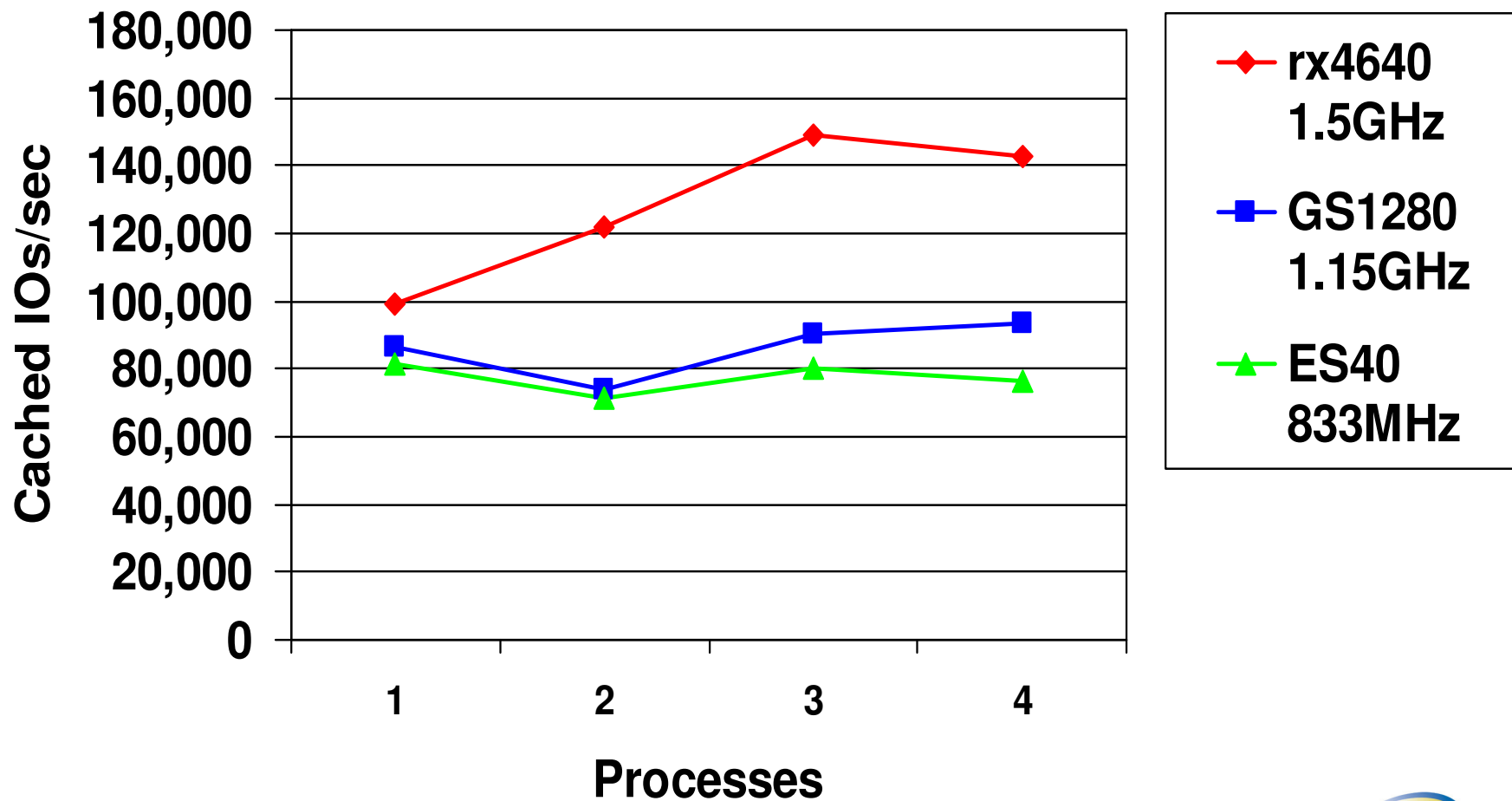
Lock Manager Stress Test



XFC Cached 1 Block IOs

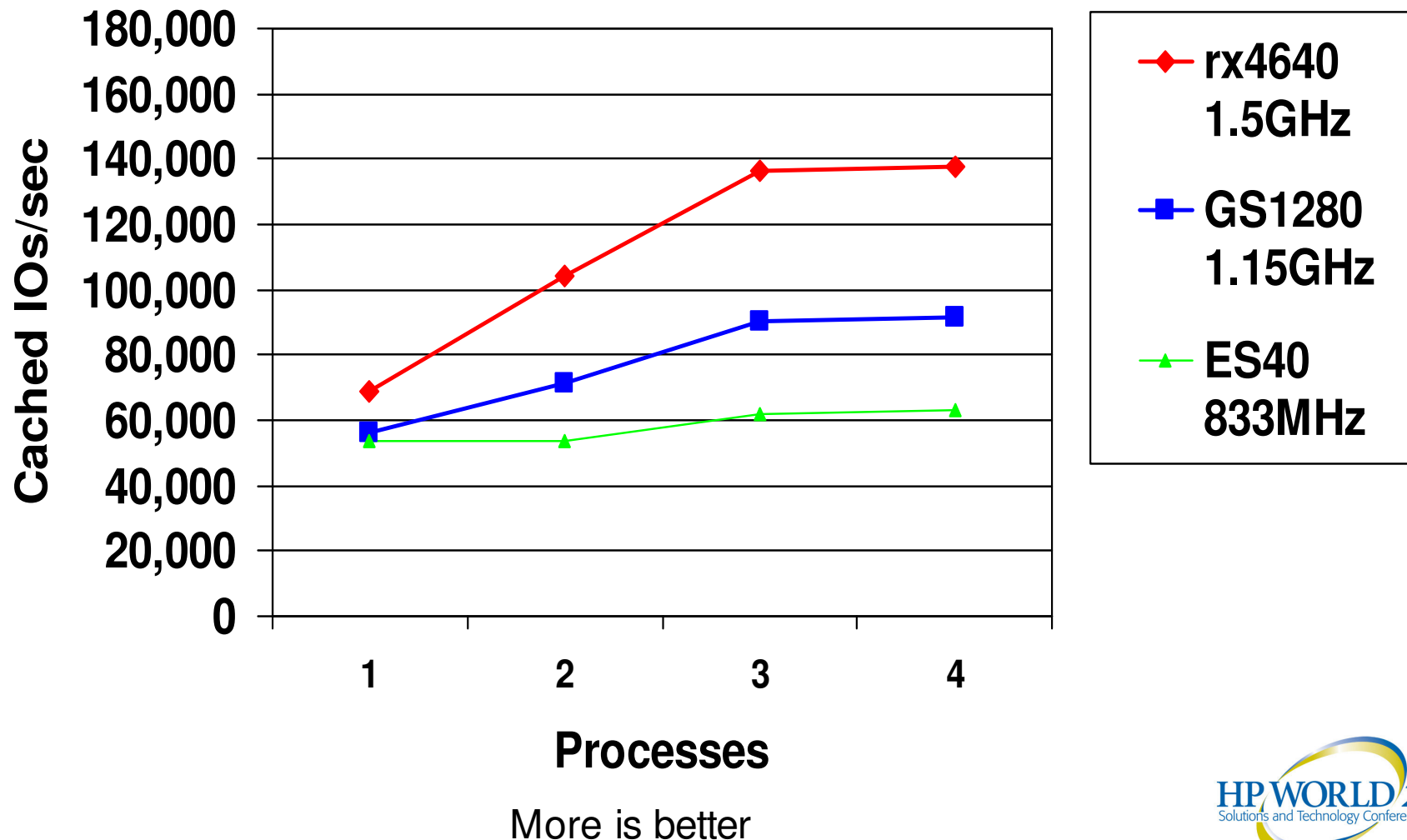


XFC Cached 4 Block IOs

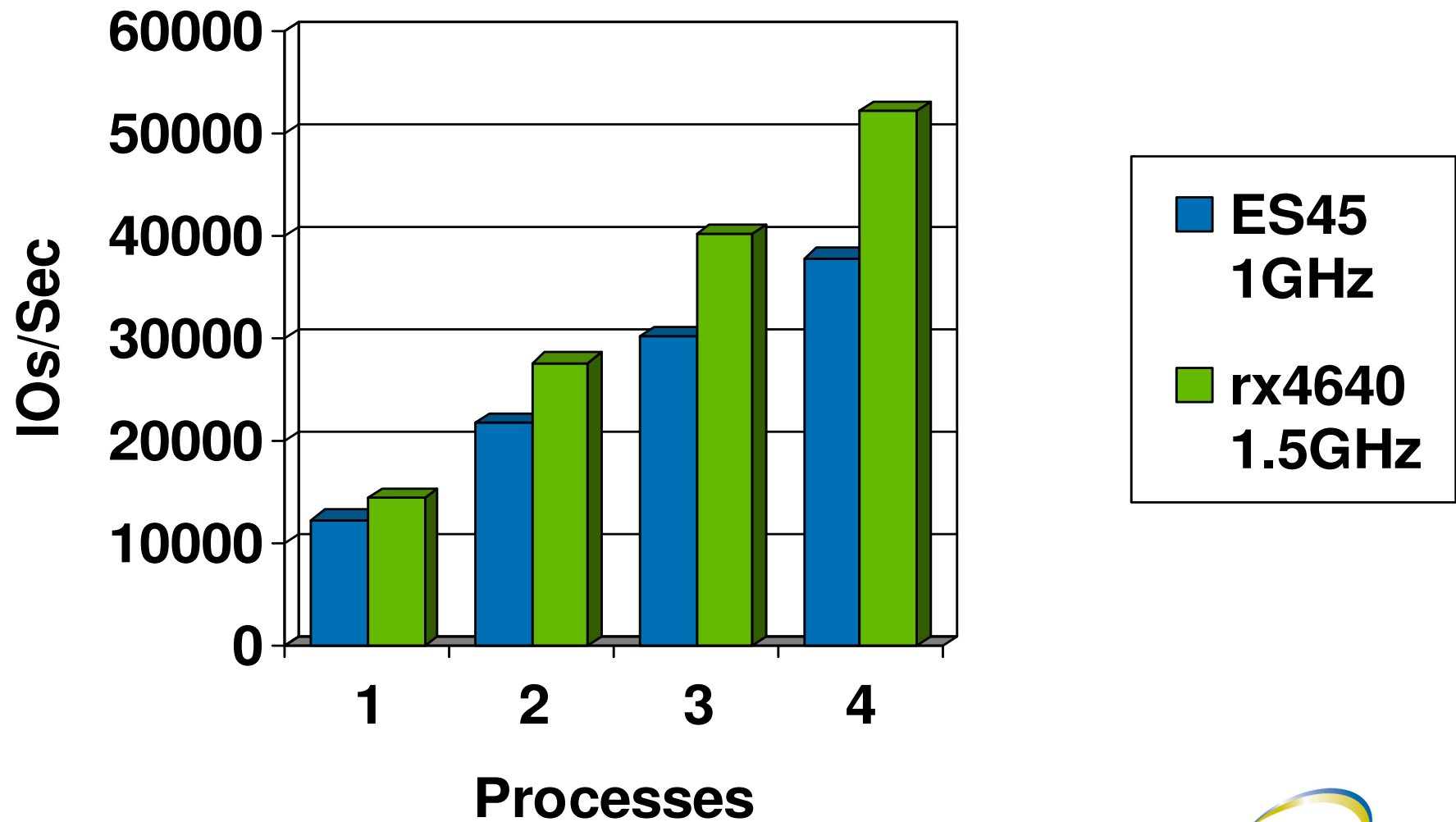


More is better

XFC Cached 16 Block IOs

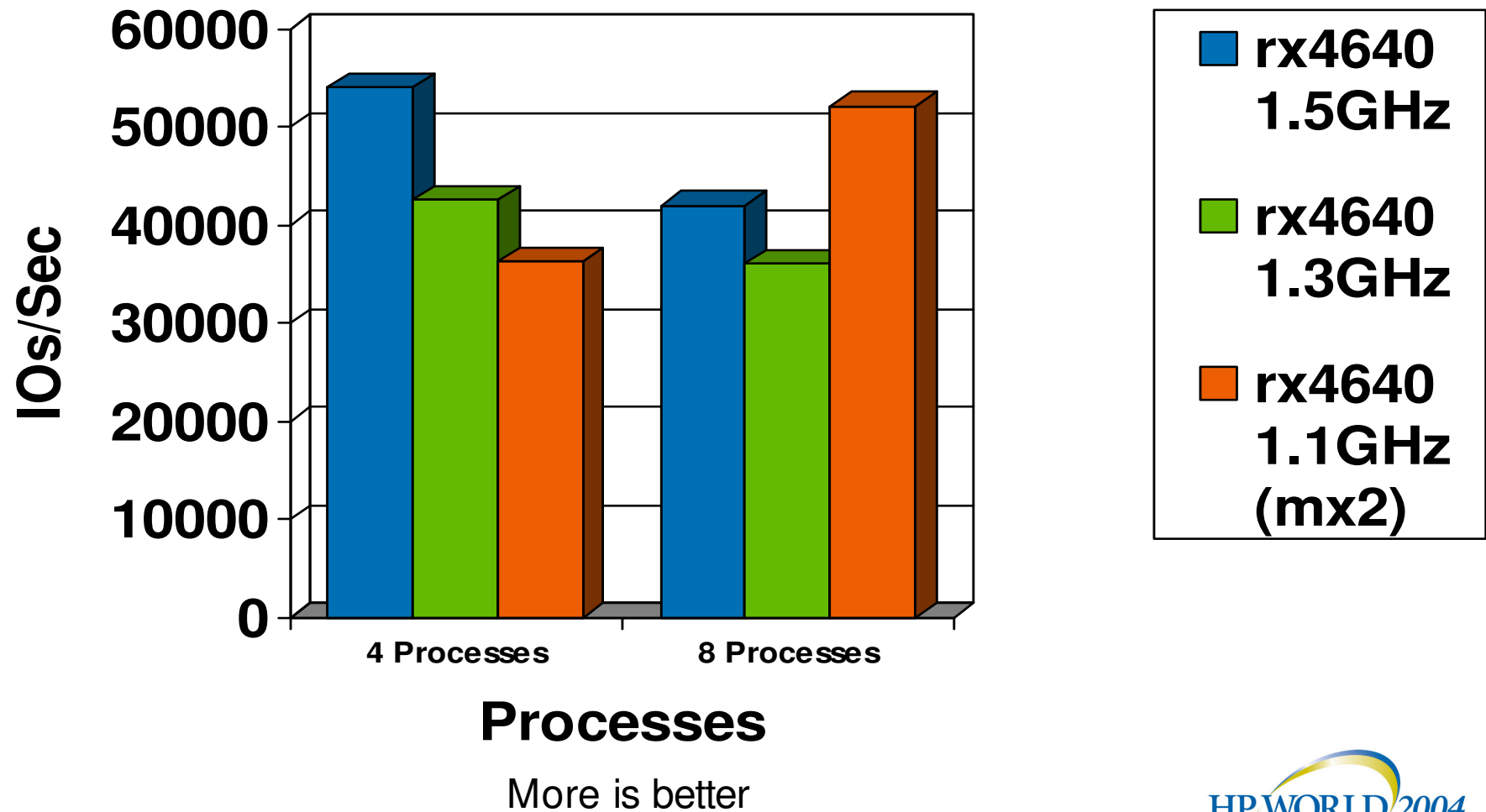


RMS1 (RAMdisk)



More is better

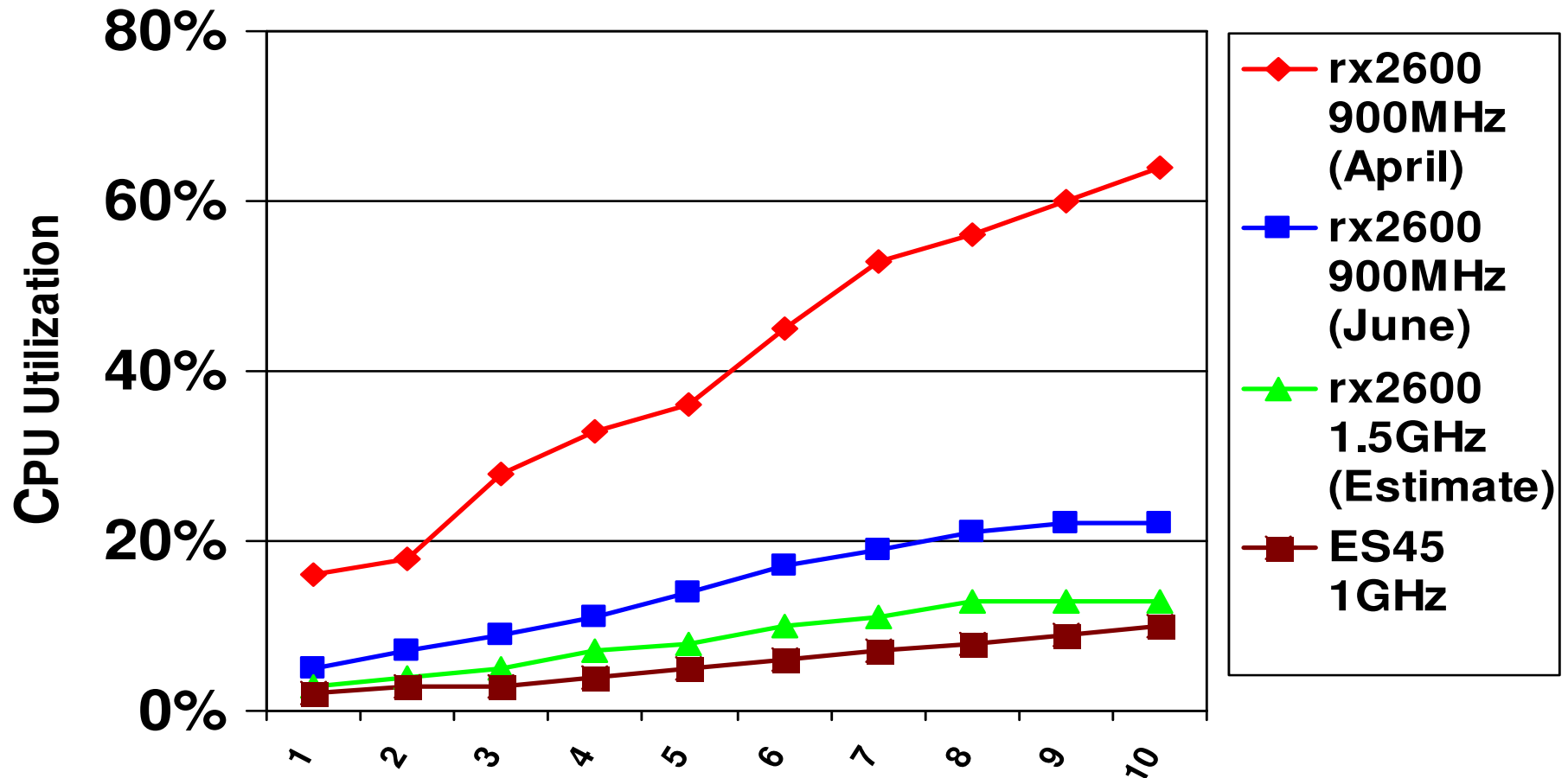
rx4640 vs. rx4640-8 (mx2 module)



OpenVMS InfoServer CPU Usage



(Advanced Development Project)



Active Client Loads

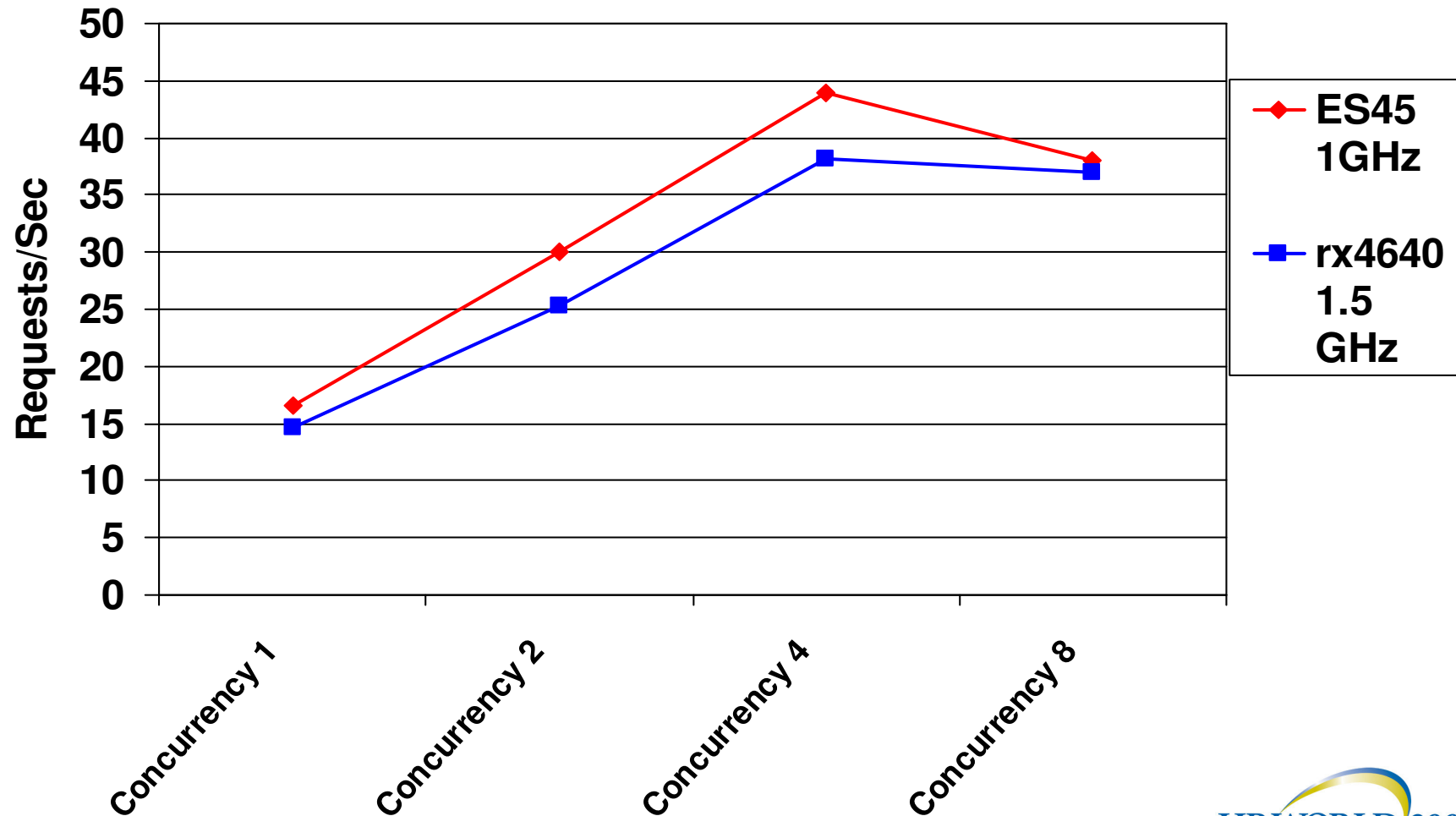
Backup/Image from InfoServer to local device

Less is better



Apache Requests Per Second

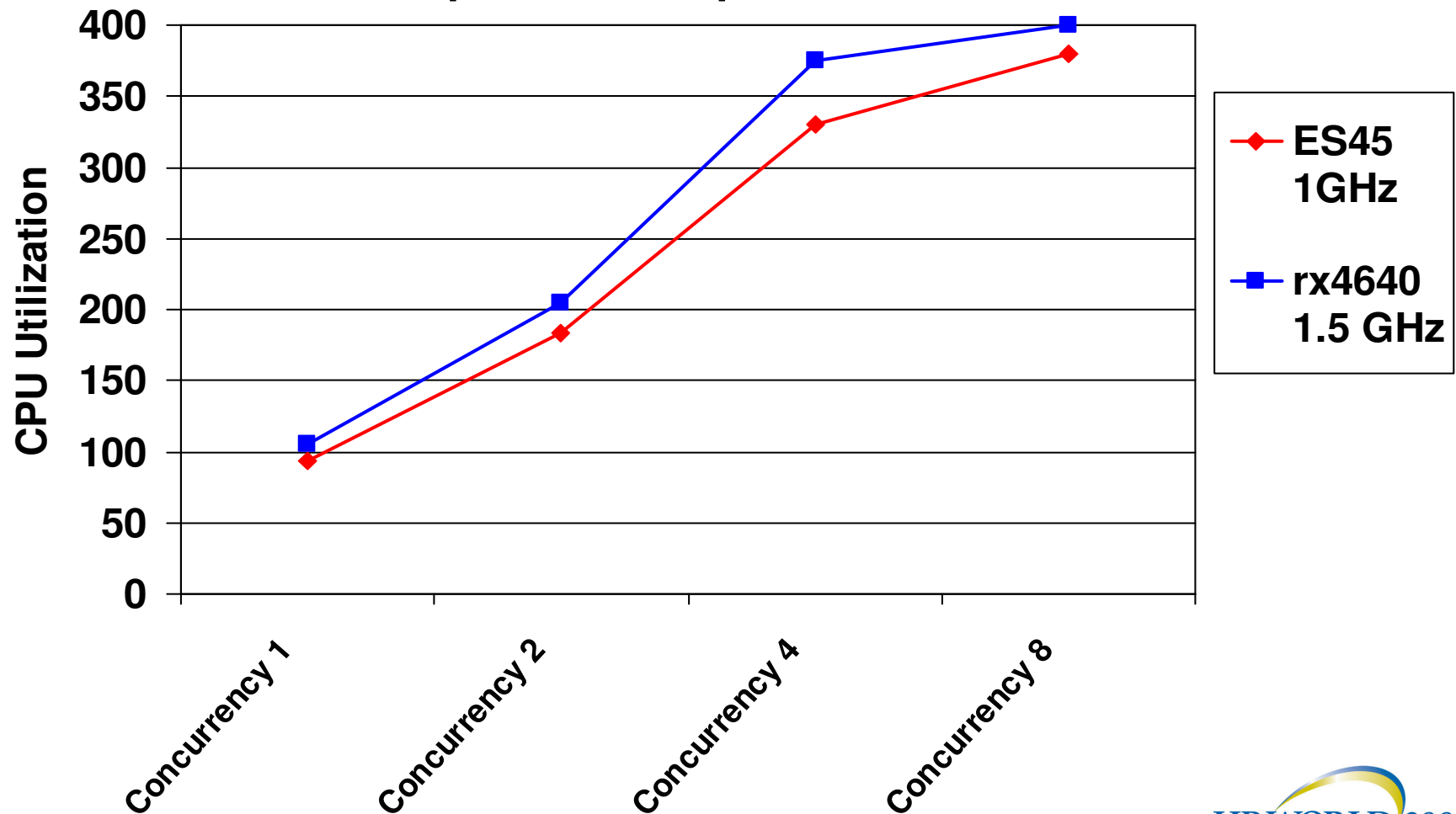
Simple CGI Script



More is better

Apache – CPU Utilization

Simple CGI Script



Less is better

Various Improvement Successes

- Heavy IO loads to disks performed very poorly
 - rx2600 2,084 IOs/sec
- Spinlock Analysis showed VERY heavy usage of MMG for the IPF which didn't appear for the Alpha
- Further Analysis showed IPF was never caching any KPB structures.
- One line fix ->
 - rx2600 10,999 IOs/sec

OTS\$MOVE and OTS\$MOVEM

- OTS\$MOVE and OTS\$MOVEM are low level routines called by compilers to move data.
 - Macro calls this for MOVC3 and MOVC5 instructions
 - C calls this routine for memcpy
 - BLISS call this for ch\$move
- Highly optimized versions of these routines have recently been integrated into OpenVMS
- This resulted in significant performance improvements for tests that did heavy memory copies
 - The RMS1 test improved by about 15% for single stream and by about 38% for 4 streams!

Queue Instructions

- The various VAX architecture queue instructions were initially implemented as system services
 - These needed to be done in Kernel mode to insure the operation was atomic
 - We knew they would be slow and they were as shown by a small test program doing insque/remque in loop.

ES45: 0:05.21 rx2600: 2:58.21 (34 times slower)

- The implementation of the queue instructions has been changed to no longer use the system service dispatcher
- They now use the EPC (Enter Privileged Code)

rx2600: 0:14.59 (< 3 times slower)

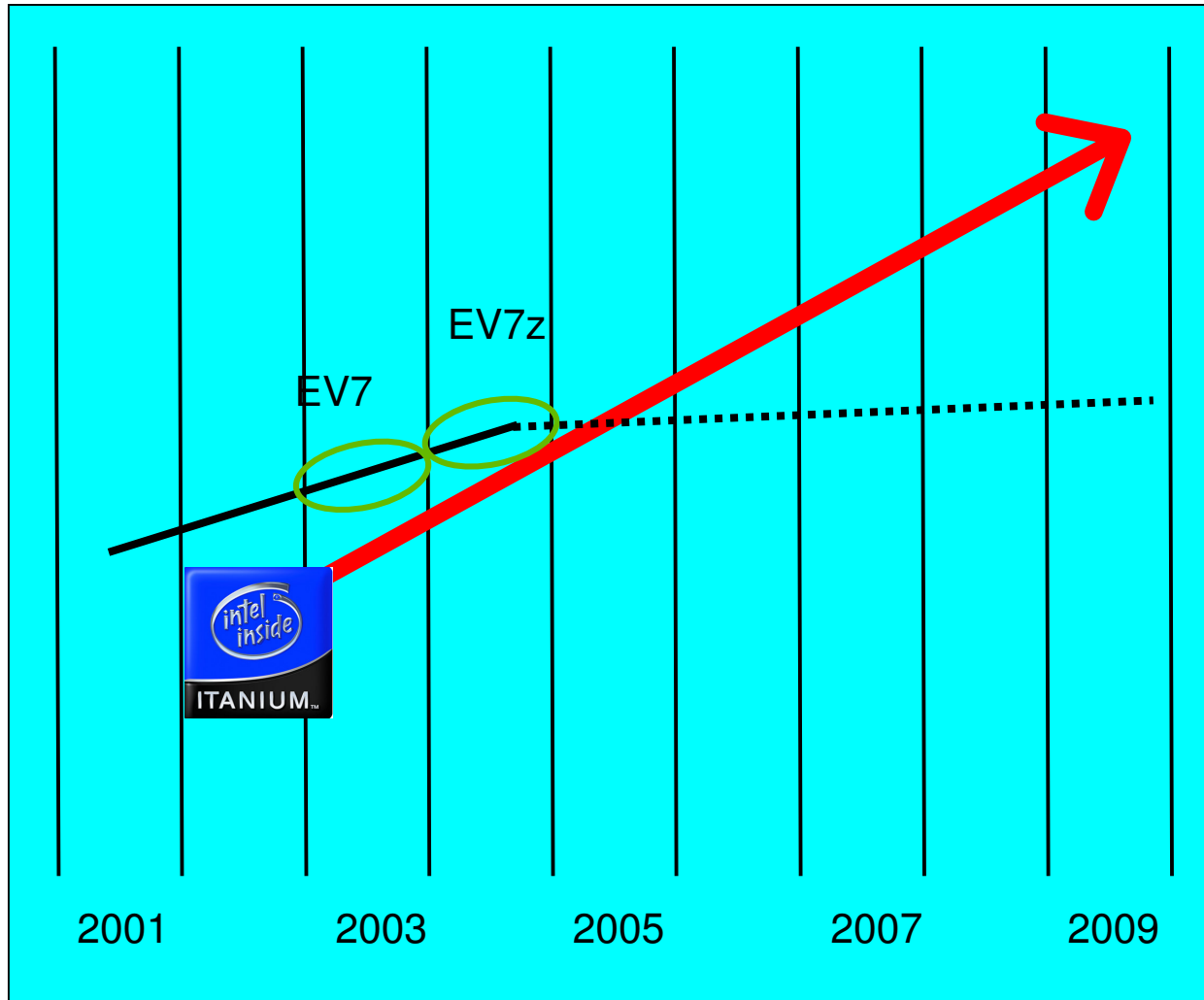
Areas that are Slower on IPF

- There are several areas where the equivalent operations on IPF systems are slower
 - Queue Instructions
 - Various PAL calls which now go through the system service dispatcher
 - Exception Handling
 - Exceptions Frames much larger
 - Finding Exception Handlers takes longer
- Images also are typically 3 times as large
 - This can impact image activation time
 - Requires More IO
 - Increase page faults

Projected Performance Crossover Point predicted two years ago



OpenVMS on



Conclusions

- 1.5GHz rx4640 Integrity systems perform similarly to 1GHz ES45 Alpha systems
- There will continue to be improvements in both the OS and Compilers prior to the release of OpenVMS V8.2
- OS improvements coupled with future hardware speed ups will allow OpenVMS on IPF to outperform OpenVMS on Alpha

HP WORLD 2004

Solutions and Technology Conference & Expo

Co-produced by:



RECOMMENDED TRAINING VENUE FOR THE
HP Certified Professional

