

FINE OLD WINE IN NEW BOTTLES

**CHARON-AXP in Oracle Cloud
with Oracle Rdb and VSI OpenVMS**



Disclaimers

- ◆ Each system/application unique
- ◆ Isolated performance tests result in imperfect world views
- ◆ Evolving software & hardware are moving targets
- ◆ Tuning trumps hardware



Background

Implementation

Measurements

Adjustments



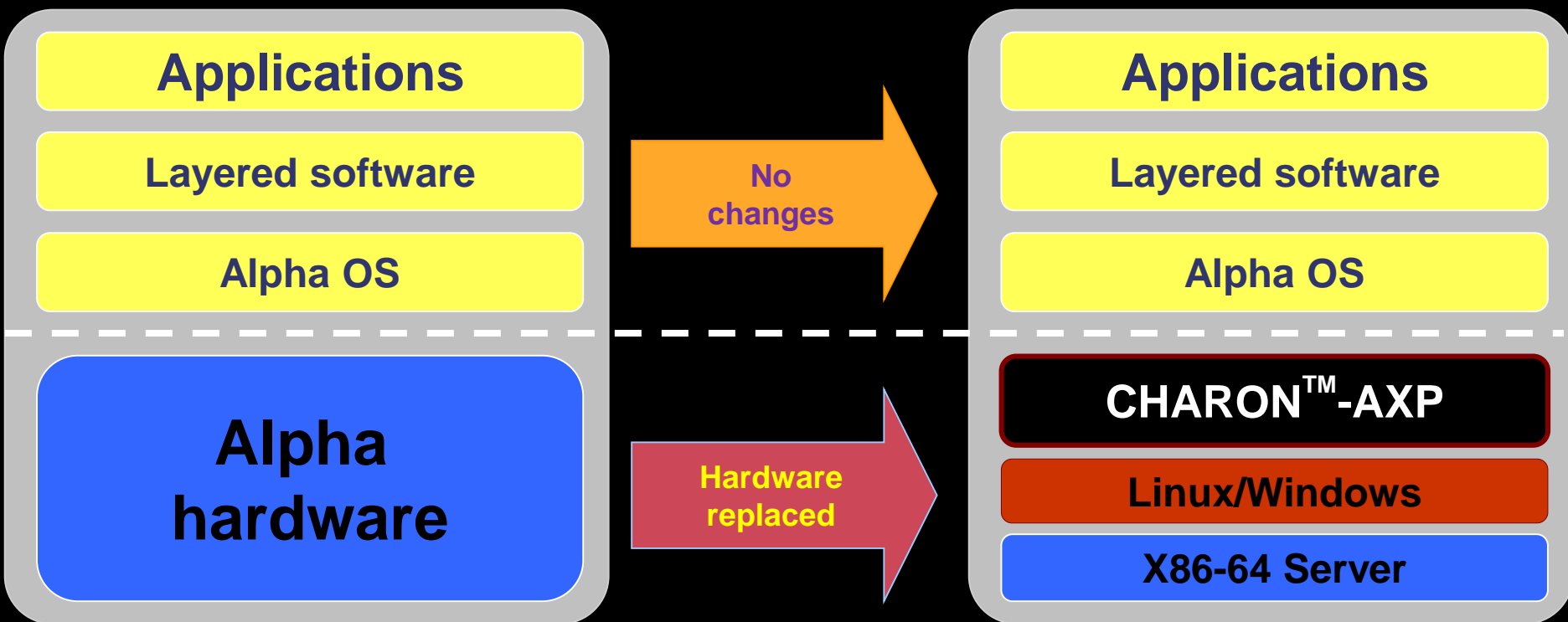
Background

- ◆ Customer wishes to migrate from on-premises AlphaServer hardware to emulation
 - ◆ Reduce to zero : downtime, power, cooling, space, maintenance, management, risk
 - ◆ No application or system changes : Lift-and-shift
- ◆ GS1280 to Charon-AXP on Oracle Cloud
- ◆ Fastest AlphaServer : tough to beat
- ◆ SCI engaged by Oracle and Stromasys to facilitate proof-of-concept

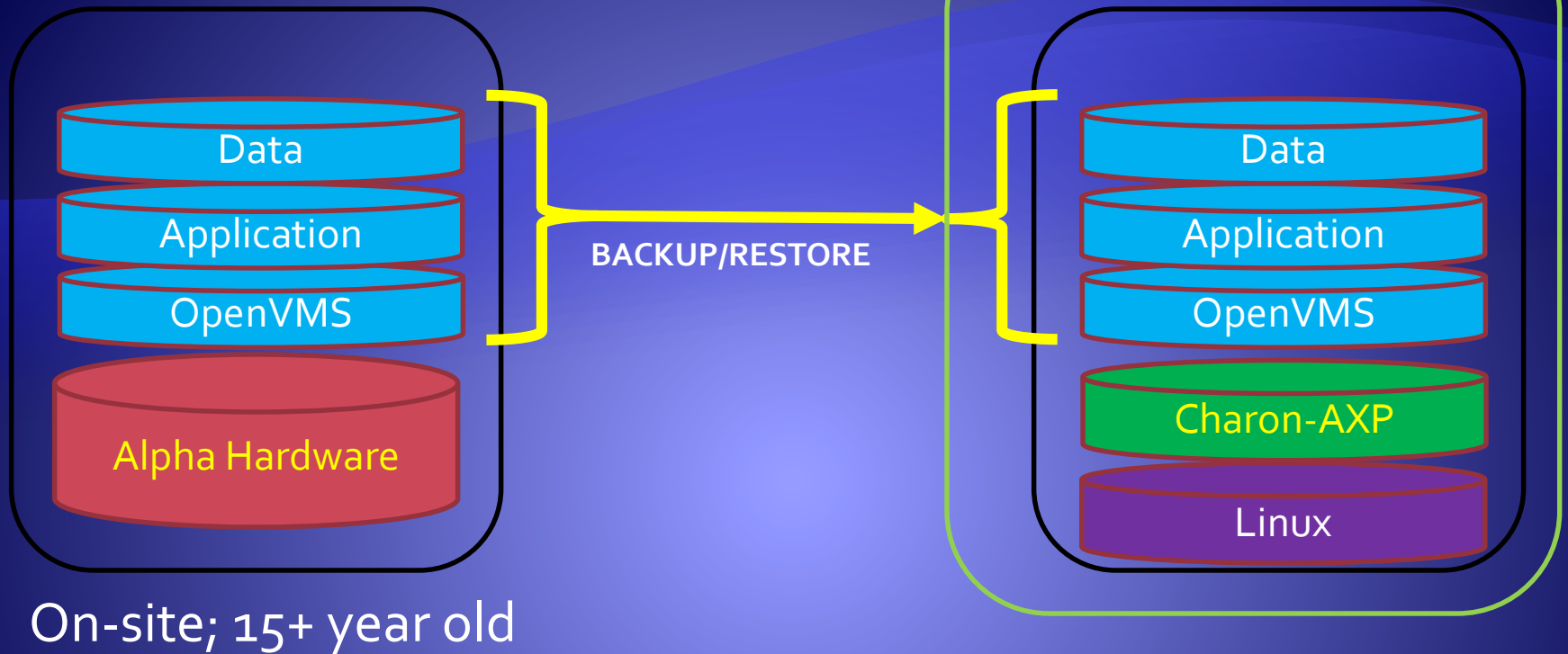


CHARON Emulation

- ◆ Thousands installations globally
- ◆ Worldwide development & support organization
- ◆ Recognized as the drop-in replacement for hardware
- ◆ Rock solid
- ◆ Very low-risk deployment
 - ◆ Transparent & direct hardware replacement
 - ◆ No software impact



Intent



- ◆ 36C @3.7T, 384GB, NVMe
- ◆ Bare metal
- ◆ Oracle Linux 7.6 UEK
- ◆ Charon-AXP V4.9
 - ◆ 16P GS1280, 128GB
 - ◆ 2 NIC, 4 disk volumes

Anticipations

- ◆ Emulated quicker than hardware
 - ◆ Most workloads faster; some slower
- ◆ Disk
 - ◆ Lower latency
 - ◆ Greater bandwidth
- ◆ Maximal memory relieves IO requirements
- ◆ Impressively performant for commercial workload



VSI OpenVMS

- ◆ VSI OpenVMS Alpha V8.4-2L2
 - ◆ Performance optimized for EV6 & later processors
 - ◆ Shorter/faster instruction sequences
 - ◆ Benefits emulation equally
- ◆ SGI experience ~5% to ~25% faster
 - ◆ Workload dependent
- ◆ Binary compatible with prior DEC/CPO/HP/VSI OpenVMS Alpha releases & software



Project Outline

- 1) OCI provides Oracle Linux pre-installed
- 2) Configure virtual NICs for OpenVMS guest
- 3) Configure block storage
- 4) Install Charon software packages/dependencies
- 5) Configure Charon-AXP emulator
- 6) Backup existing OpenVMS system to container files; transfer to host
- 7) Boot OpenVMS Alpha from container files
- 8) Configure TCPIP address, Gateway, DNS, NTP



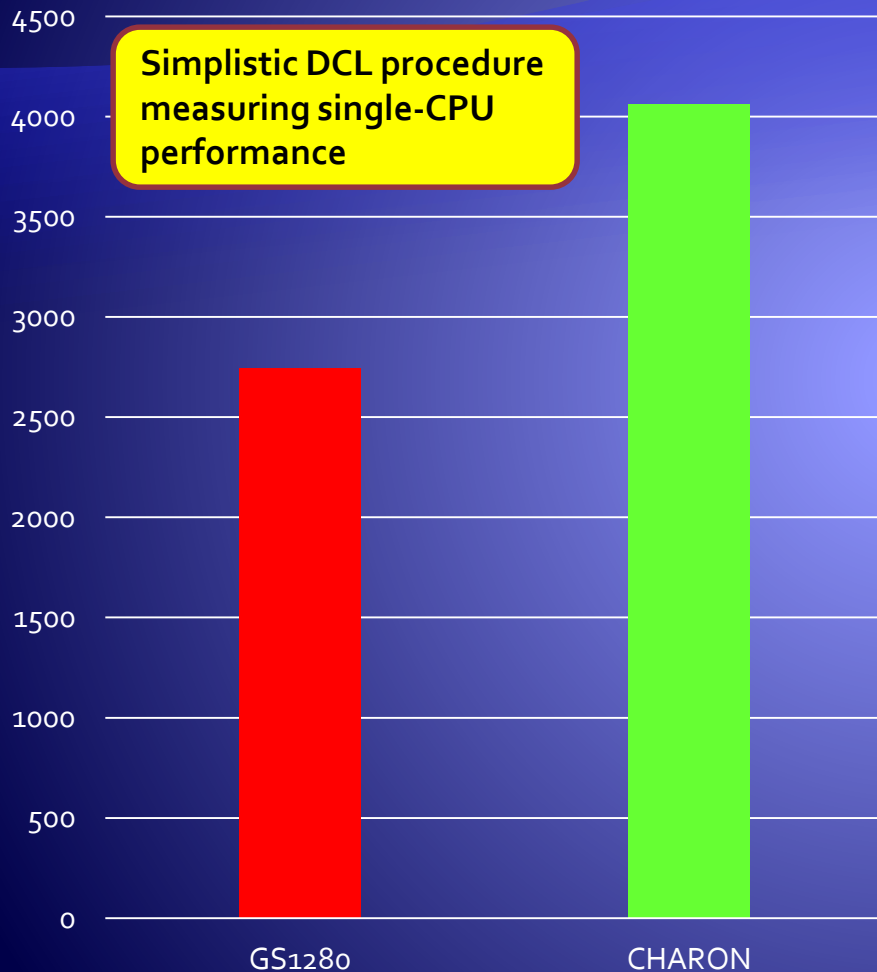
Performance Tests

- ◆ SCl executed numerous micro performance tests to evaluate various aspects of system, CPU & IO
- ◆ In isolation to help identify component behavior
- ◆ Provides insight : application experience



CPU Up To 50% Faster – "Fastest Alpha We Have Seen"

Estimated VUPS



more is better

OpenVMS Locking Performance



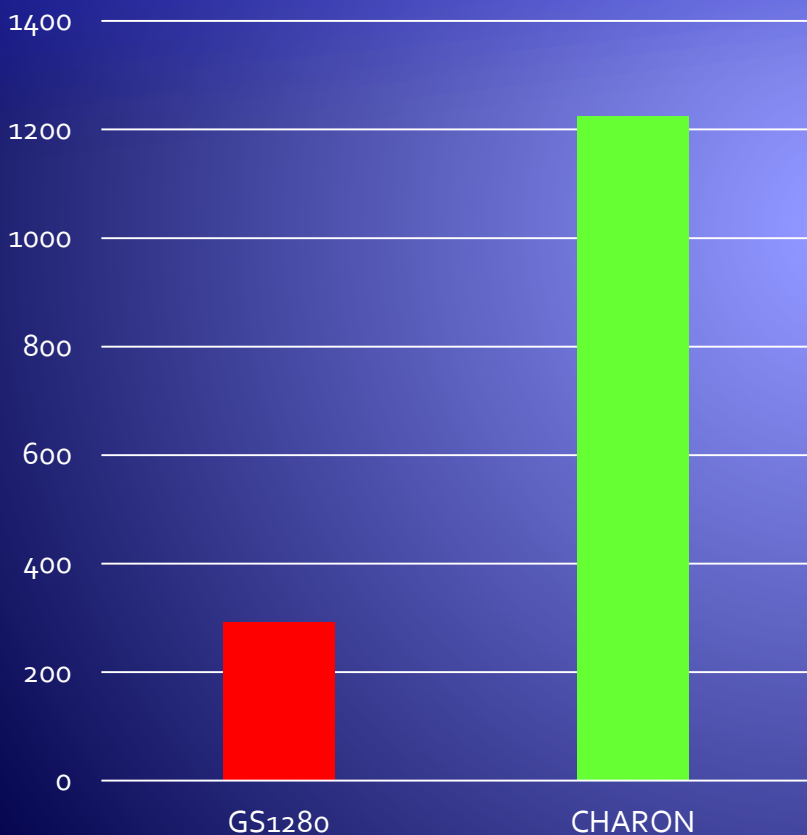
more is better

Single Disk > 10X faster

Bandwidth = throughput

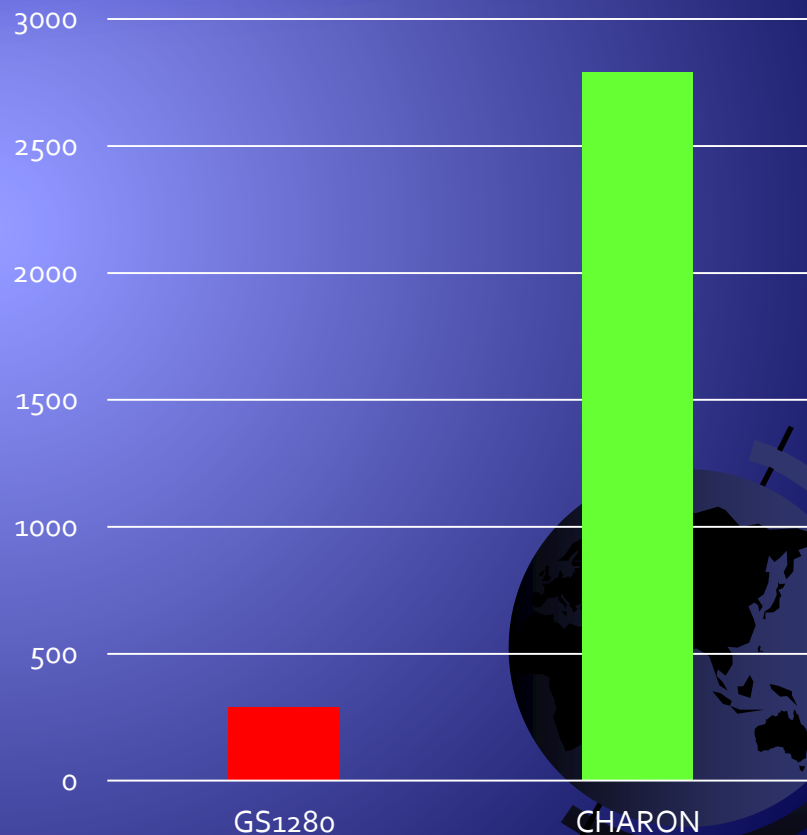
Random IO largely dominated by controller response time

Single Disk Sequential Read
Bandwidth MB/sec



more is better

Single Disk Random 32k IOPS



more is better

Synthetic Rdb OLTP Workload

- ◆ SCI constructed test framework
- ◆ 1/4 billion indexed rows of random data
 - ◆ 20 tables of 25 columns
- ◆ Application Loop
 - ◆ Start read-write transaction
 - ◆ Select random table
 - ◆ Generate random key
 - ◆ Update random column
 - ◆ Commit



731,136 Transactions / Minute

◆ >12,000 OLTP update TPS

Node: RUMP (1/1/1) Oracle Rdb V7.3-300 Perf. Monitor 23-JAN-2019 20:43:00.29
Rate: 3.00 Seconds Summary IO Statistics Elapsed: 00:01:02.28
Page: 1 of 1 DISK\$DATA1: [BIGDB.ALPHA]BIGDB.RDB;1 Mode: Online

statistic.....	rate.per.second.....			total.....	average.....
name.....	max.....	cur.....	avg.....	count.....	per.trans....
transactions	12422	12168	12185.6	758925	1.0
verb successes	86880	85101	85219.4	5307470	6.9
verb failures	0	0	0.0	0	0.0
synch data reads	0	0	0.0	0	0.0
synch data writes	0	0	0.0	0	0.0
asynch data reads	0	0	0.0	0	0.0
asynch data writes	0	0	0.0	0	0.0
RUJ file reads	0	0	0.0	0	0.0
RUJ file writes	0	0	0.0	0	0.0
AIJ file reads	0	0	0.0	0	0.0
AIJ file writes	2322	2203	2244.5	139789	0.1
root file reads	0	0	0.0	0	0.0
root file writes	21	13	13.9	870	0.0

Tuning

- ◆ Fastest platform is perfect starting point
- ◆ Careful & experienced Linux, Charon, OpenVMS, and Rdb configuration & tuning extract every cycle
- ◆ Continually ask “why isn’t it faster”

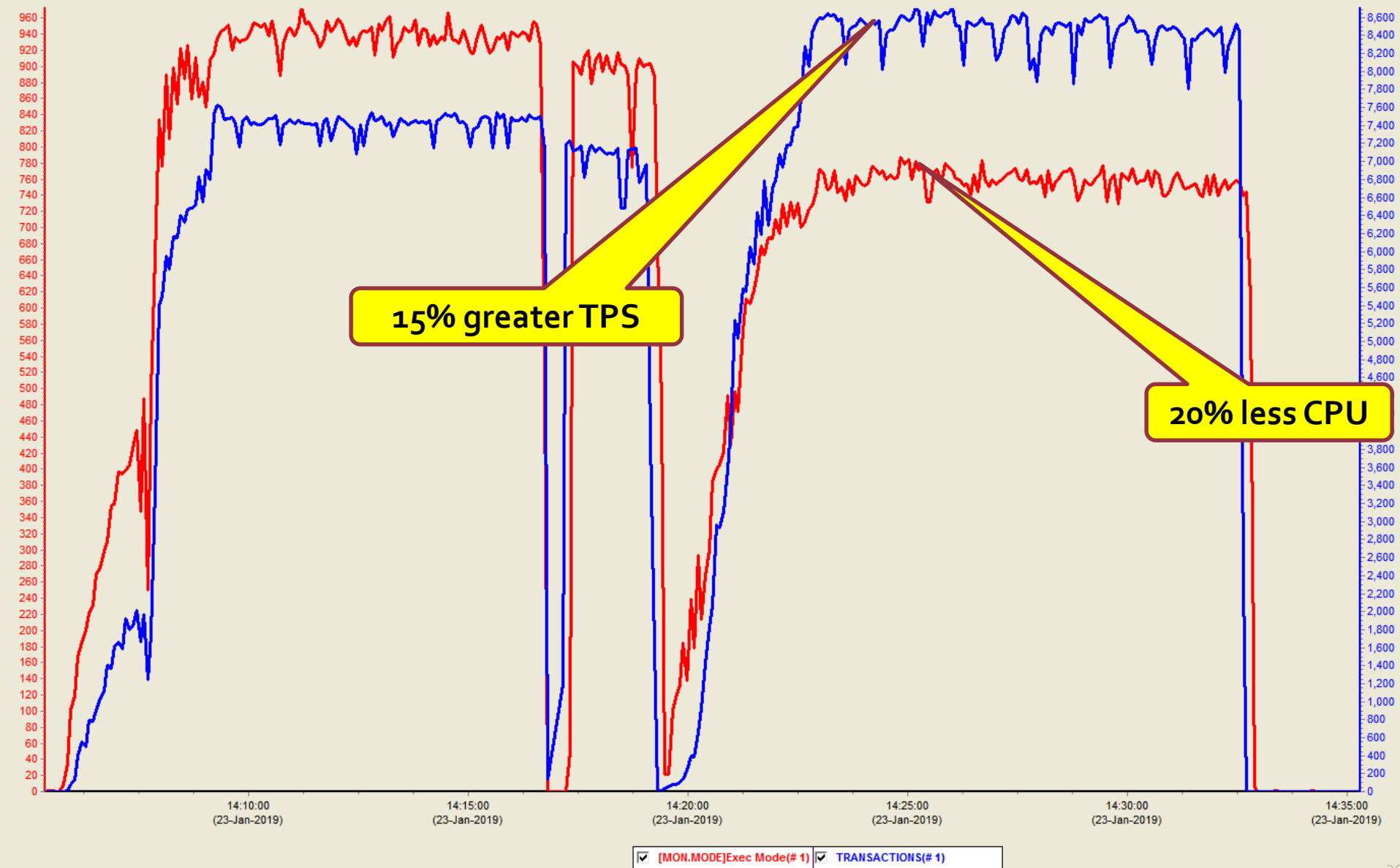


Why Aren't Rdb Workloads Faster

- ◆ Creates Alpha executable subroutines at run time
 - ◆ Per-query performance oriented
- ◆ Regrettably, code & changing data end up on same memory pages
 - ◆ Challenging for emulator translation machinery
- ◆ SCI Collaborated with Rdb engineering to prototype isolating generated code from data
 - ◆ SCI expertise in software optimizations
 - ◆ Significant potential for Rdb applications



Optimized in Rdb 7.3-next



That is

Just a Starting Point

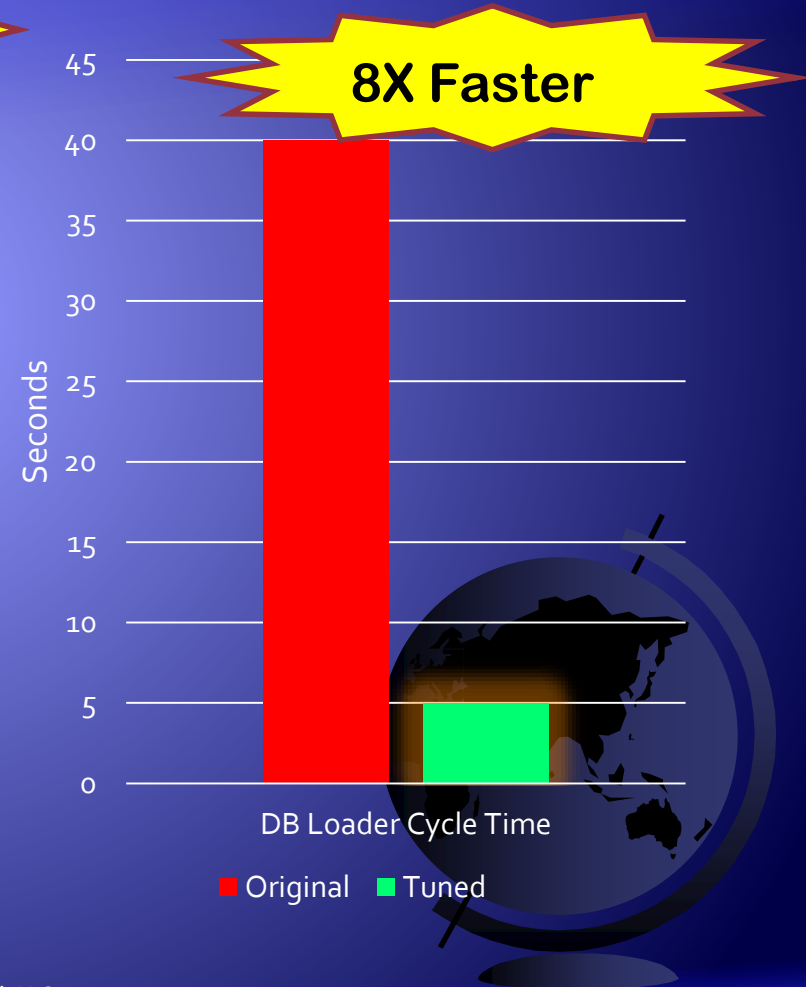
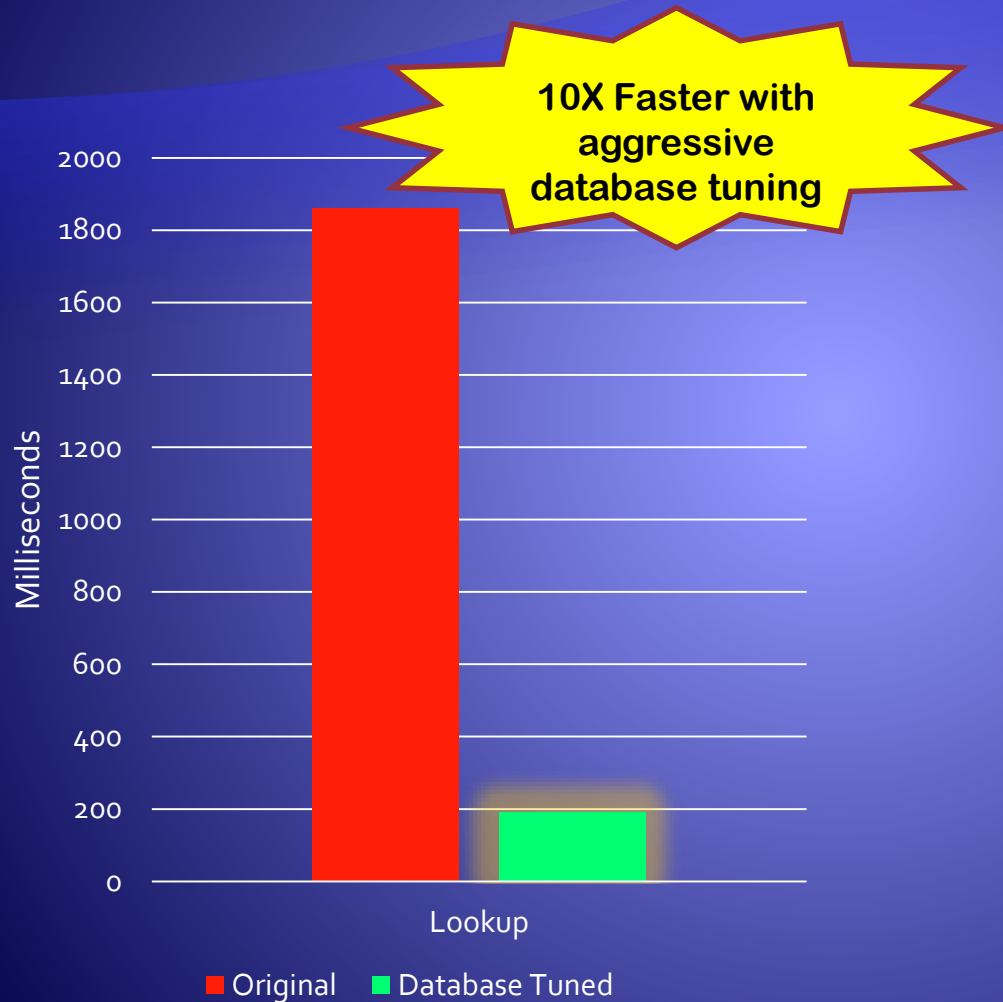


Beating Differences

- ◆ Where SCI shines
- ◆ Management, Optimization & Tuning bottom to top
 - ◆ Hardware
 - ◆ Storage
 - ◆ System
 - ◆ Databases and data files
 - ◆ Application
- ◆ Often 2X to 100X improvements

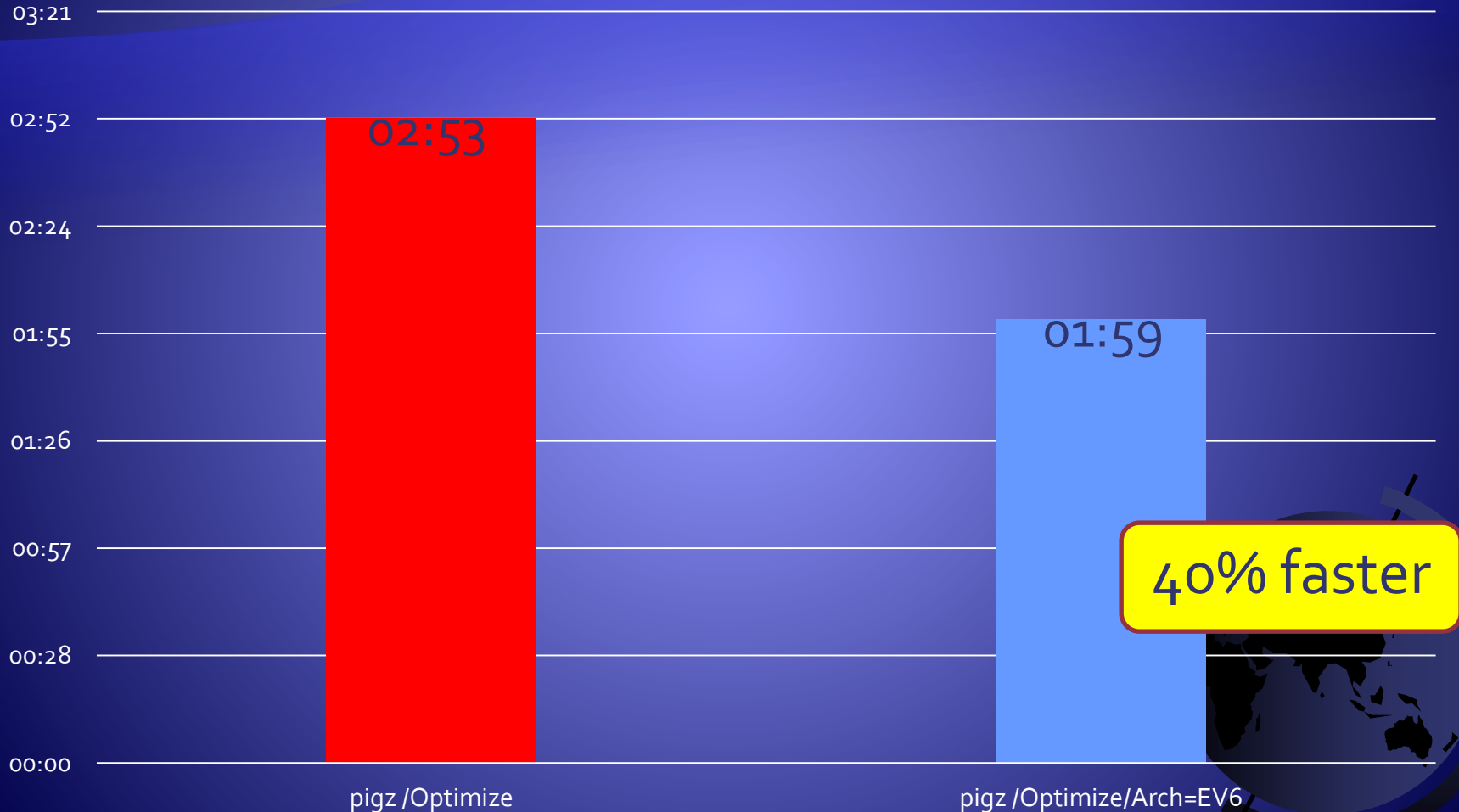


Examples : SCI Tuned



SCI Tuned : Compiled /ARCHITECTURE=

Saveset Compress Elapsed Time 4P System



40% faster

Next Steps

- ◆ Test drive Alpha on the cloud through SCI's "try before you buy" program
 - ◆ Every Alpha ever built can be improved in emulation
- ◆ SCI's remote management, system, database & application analysis & tuning, migration expertise

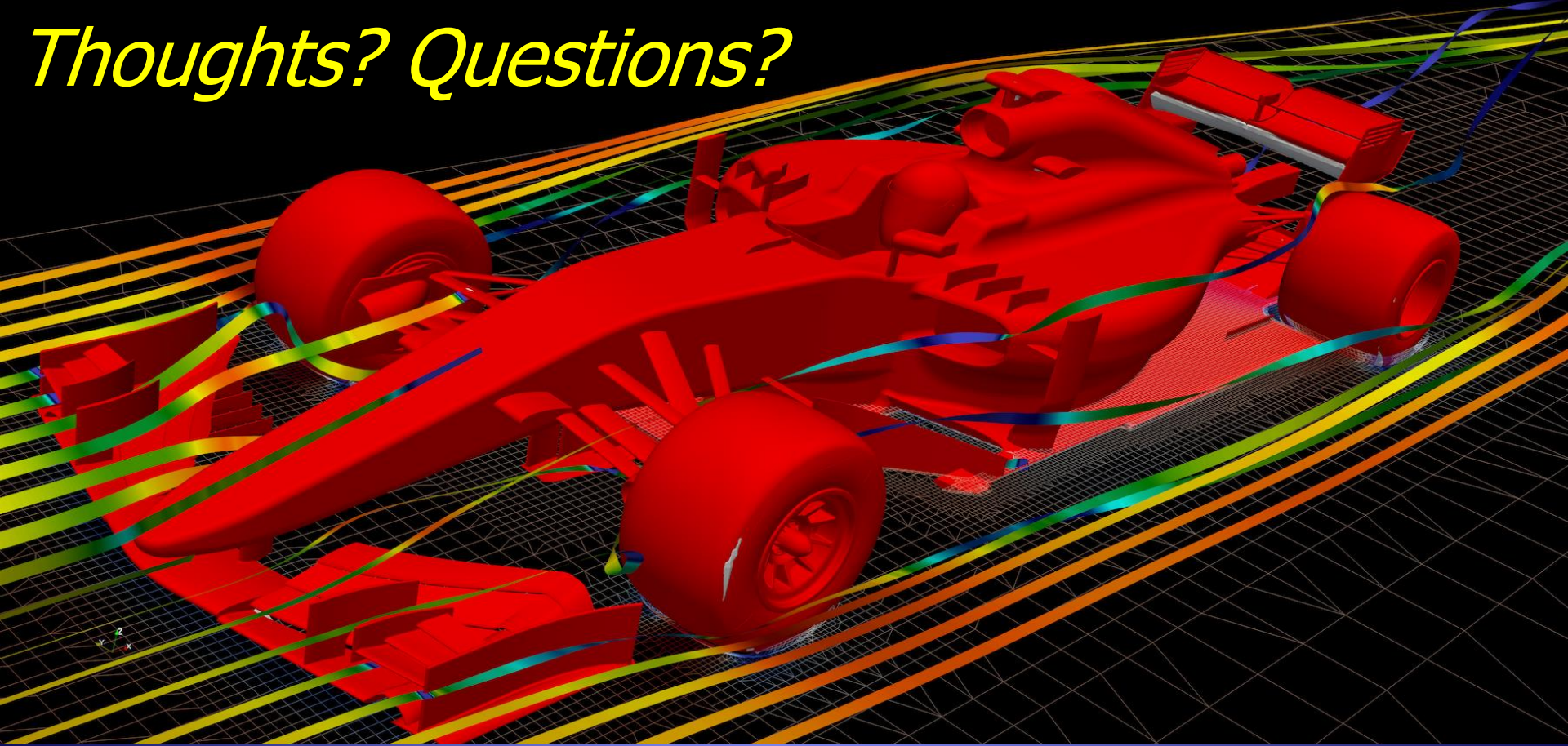


Summary

- ◆ Oracle Cloud HPC bare metal platform with Charon-AXP demonstrates fastest Alpha we've witnessed
- ◆ CHARON-AXP greater than hardware
 - ◆ CPU performance exceeds any AlphaServer for most operations
 - ◆ Superior IO bandwidth
 - ◆ > memory facilitates effective caching & reduced IO
- ◆ VSI VMS V8.4-2L2 improved performance



Thoughts? Questions?



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Rdb, Charon, Cloud :

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Credits & Extra Special Thanks

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- ◆ Marcin Zablocki
- ◆ Taylor Newill
- ◆ Tim Sneddon
- ◆ Tony DiFruscia
- ◆ Vadim Model



About Software Concepts International

Managing OpenVMS systems and
databases requiring maximum
performance and availability –
worldwide



OpenVMS Remote System Management or Database Administration

- ◆ Full Service:
 - ◆ SCI is responsible for all aspects of management or administration
- ◆ Augmentation Service
 - ◆ Augment existing staff, provide 24x7 monitoring and coverage
- ◆ Solves the problem of finding, hiring and retaining quality VMS skills
- ◆ Our customers tell us we provide “Peace of Mind” for them and their VMS systems



HPE to VSI Upgrade Services

- ◆ Completed over 30 HP to VSI VMS upgrades across 8 distinct projects in last 12 months alone

Hardware:

- ◆ Integrity HP v8.4-x → VSI v8.4-2L1
- ◆ Alpha HP v7.3 to v8.4-2L2 (Physical & CHARON)
- ◆ Alpha HP v7.3-2 → Integrity VSI v8.4-2L1

Layered and 3rd Party Products:

- ◆ Oracle Rdb, ACMS, COBOL, BASIC, Pascal, C, Python, FMS, BEA MQ, Websphere MQ, Datatrieve, Synergy/DE, JAMS, JSS, CODASYL DBMS, JDBC, Rally, SQLSERVICES, TCPIP, Attunity, Multinet...

Business Applications:

- ◆ Custom and commercial applications

Clustering:

- ◆ Single nodes, clusters, multi-site clusters

Industries:

- ◆ Healthcare, Financial, Manufacturing, Insurance, Leasing, Distribution and Gaming
- ◆ VSI Professional Services Alliance – original member



Software Concepts International

- ◆ Located in Nashua, NH, USA
 - ◆ Since 1995 business supporting OpenVMS
- ◆ International reputation as leading provider
 - ◆ Managed services for OpenVMS & databases
 - ◆ OpenVMS & database performance & consulting
- ◆ Proven global track record
 - ◆ Actively managing 100s of systems & databases 24x365
- ◆ VAX/Alpha emulation – CHARON expert reseller
- ◆ Migration consulting
 - ◆ Specializing in minimal downtime migrations
- ◆ Stromasys, VSI and Oracle expert business partner
 - ◆ VSI Professional Services Alliance
- ◆ Oracle's worldwide provider of CODASYL DBMS training

