

# 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

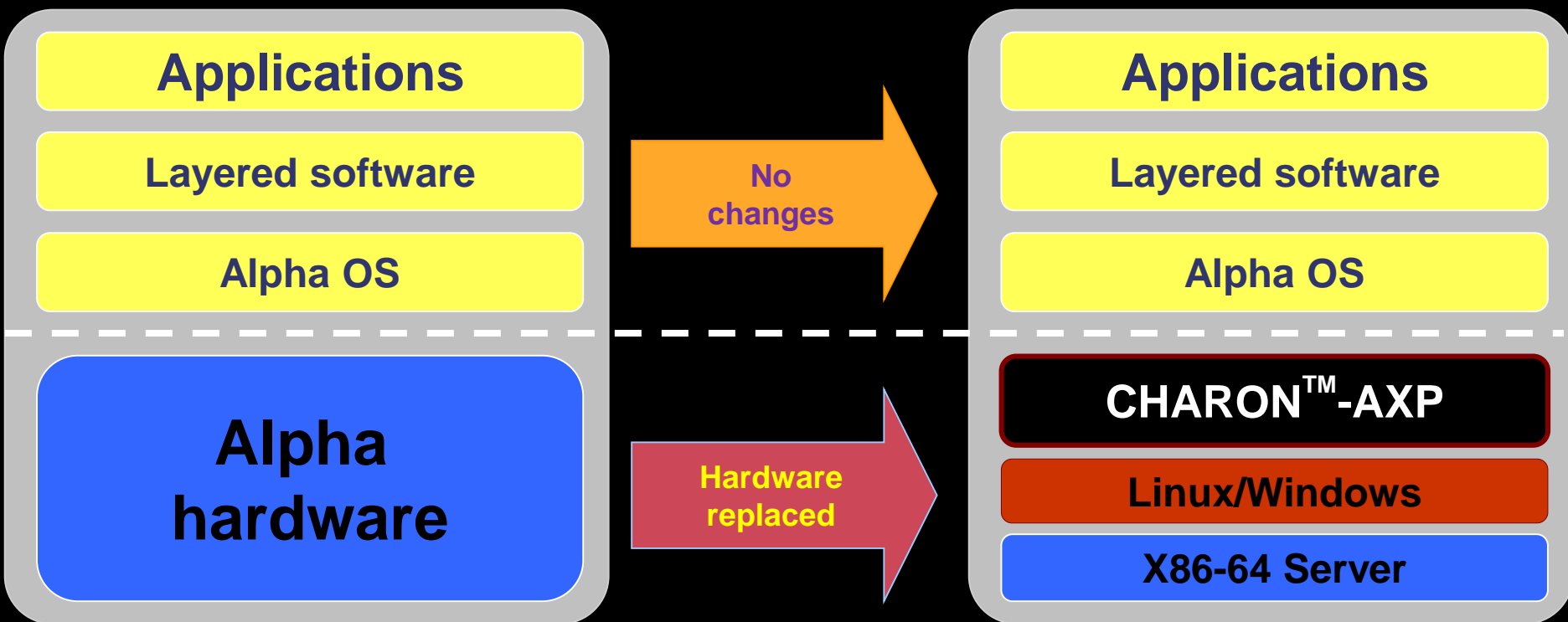
- ◆ Customer wishes to migrate from on-premises AlphaServer hardware to emulation
  - ◆ Reduce to zero : downtime, power, cooling, space, maintenance, management, risk
  - ◆ No application or system changes : Lift-and-shift
- ◆ GS1280 to Charon-AXP on Oracle Cloud
- ◆ Fastest AlphaServer : tough to beat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



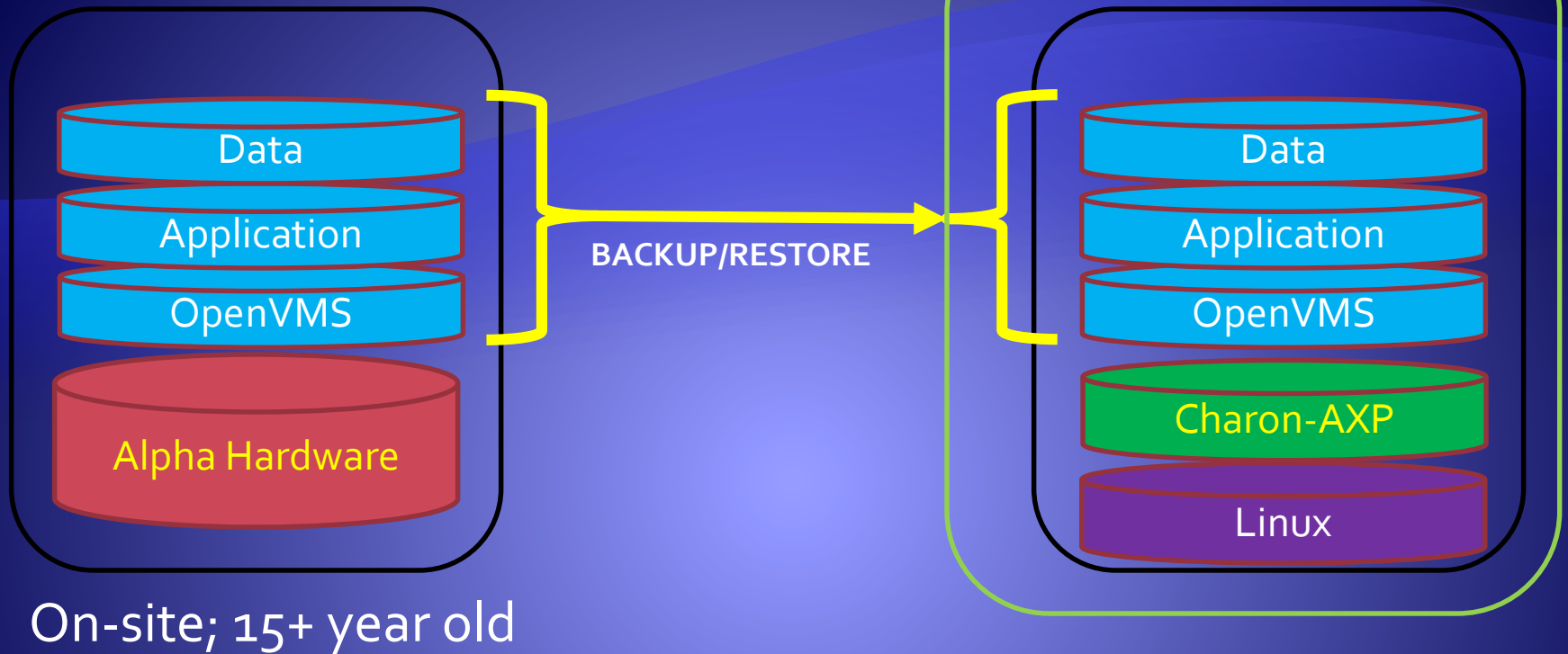


# CHARON Emulation

- ◆ 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
- ◆ SCI 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



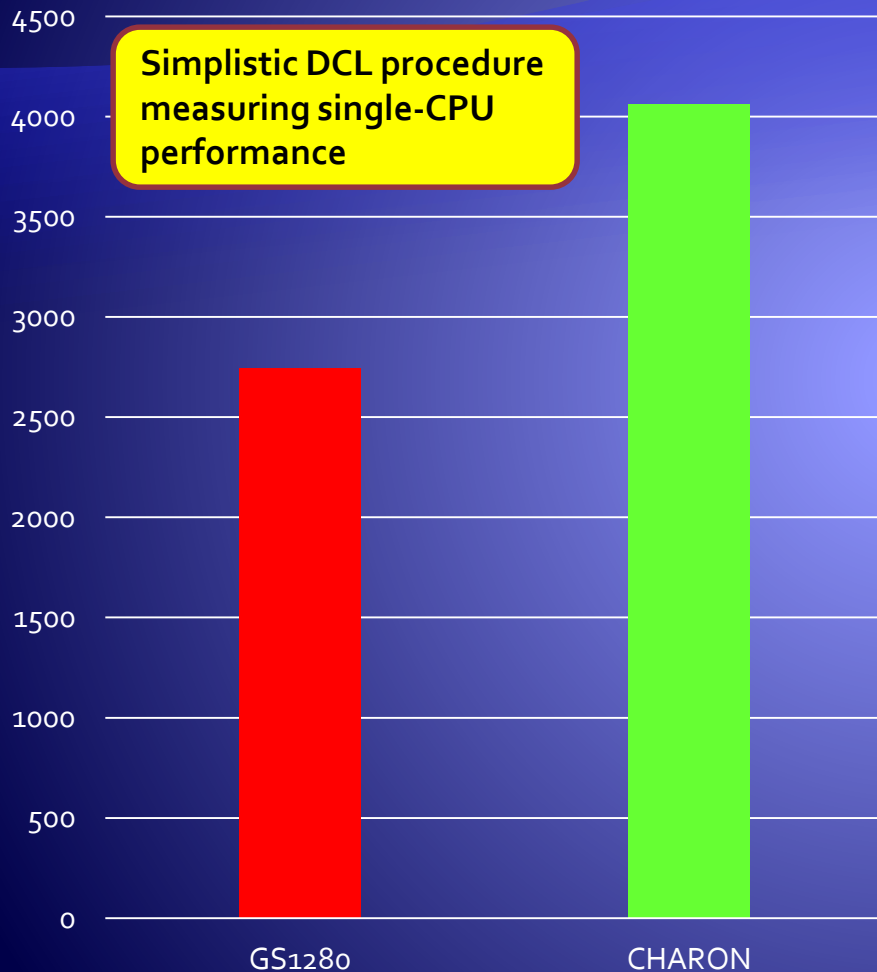
# Performance Tests

- ◆ 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



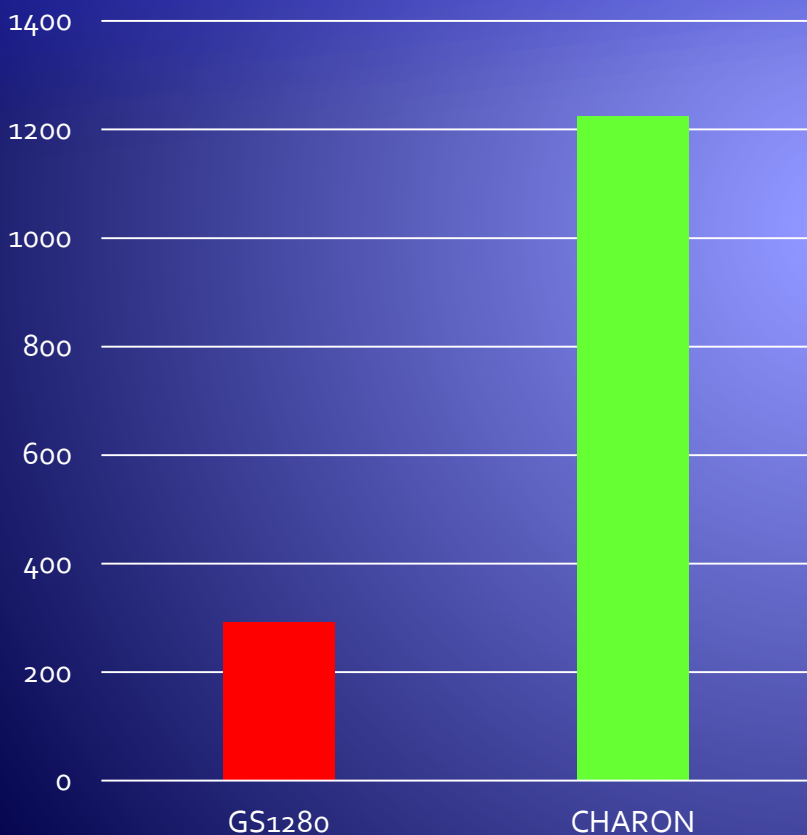
more is better

# Single Disk > 10X faster

Bandwidth = throughput

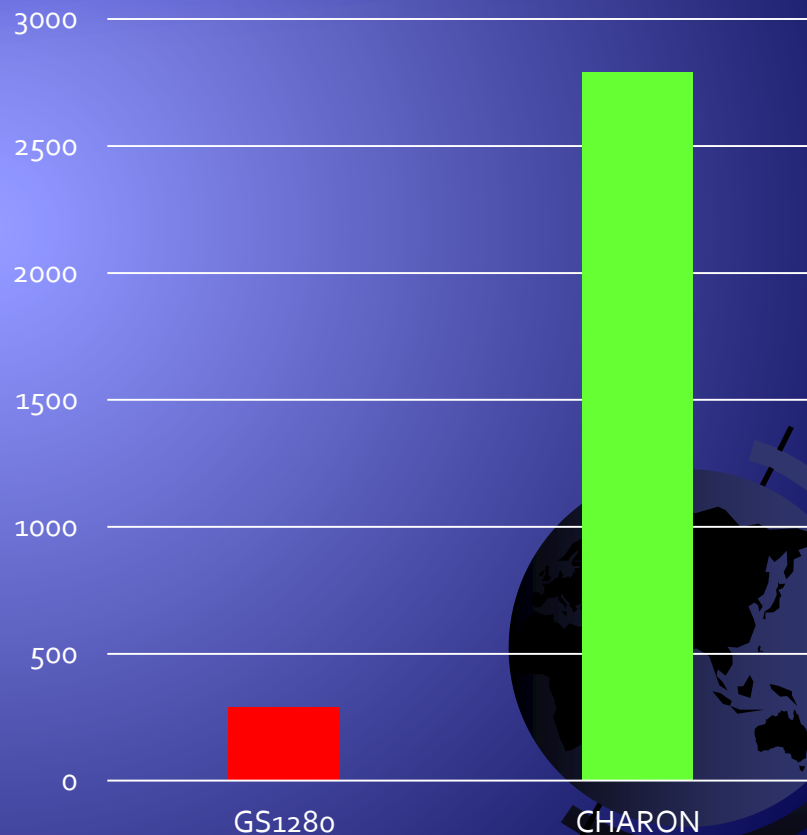
Random IO largely dominated by  
controller response time

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

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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”

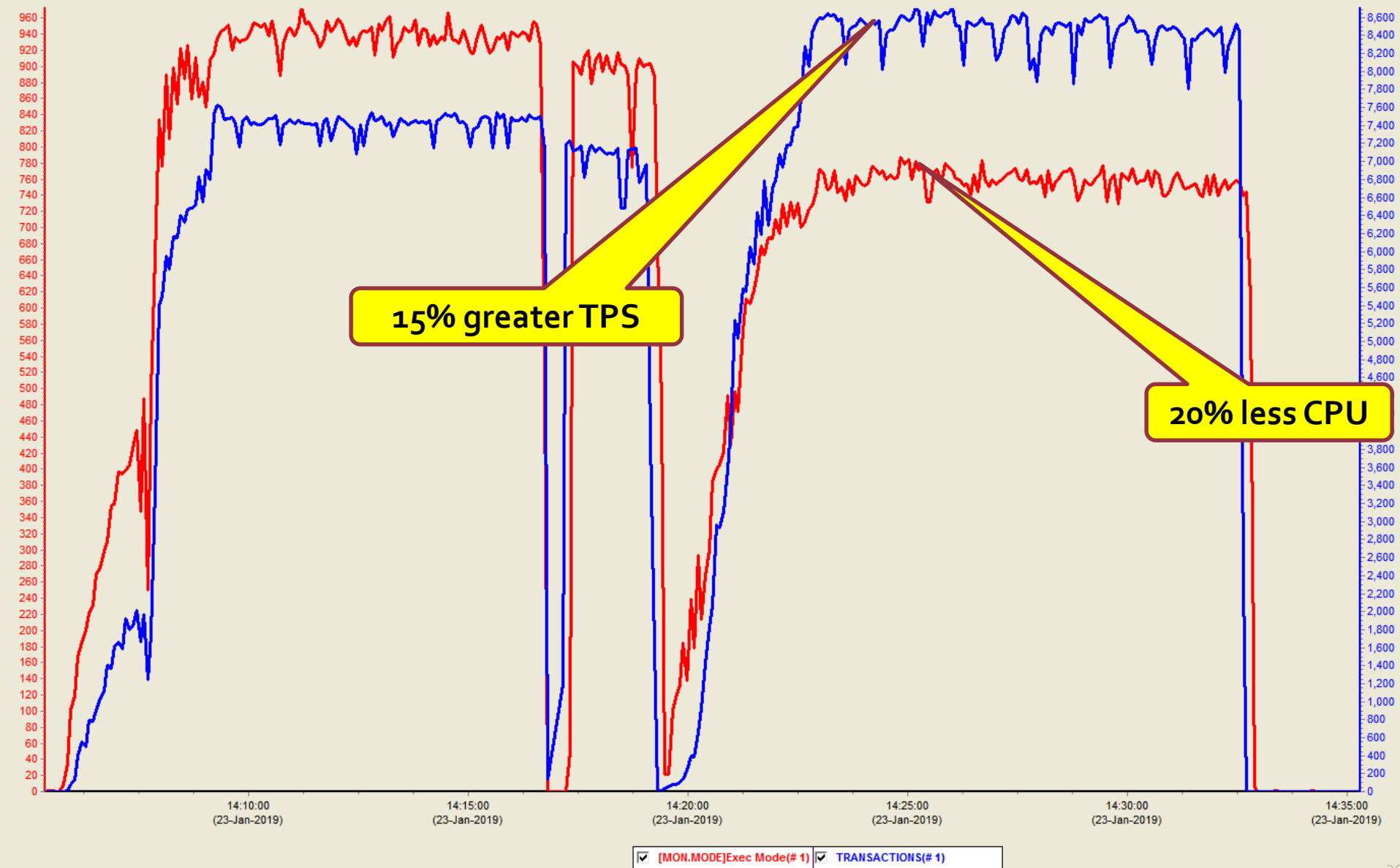


# Why Aren't Rdb Workloads Faster

- ◆ 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



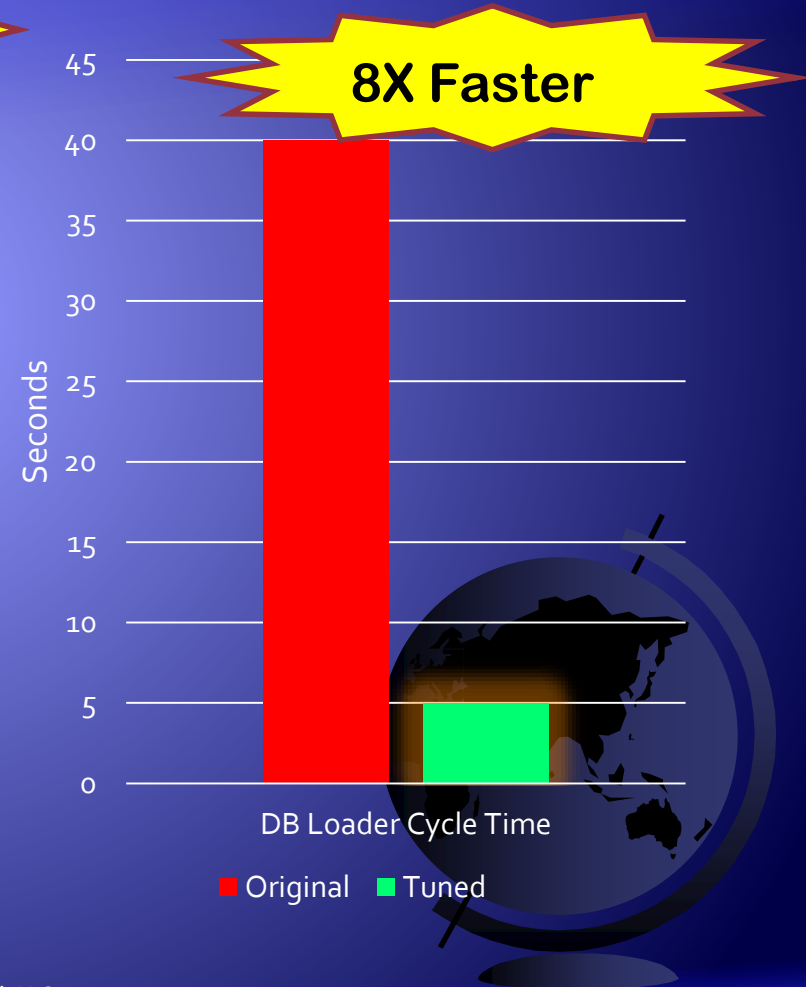
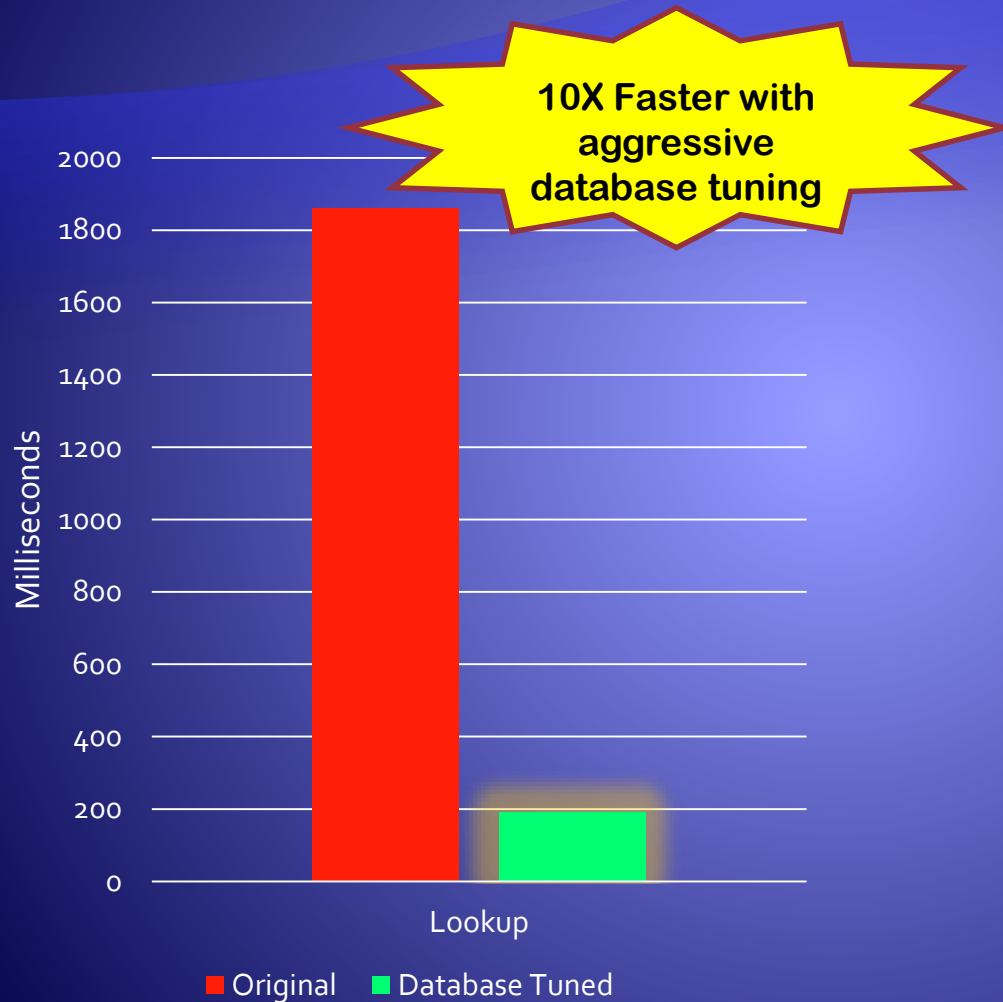


# Beating Differences

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

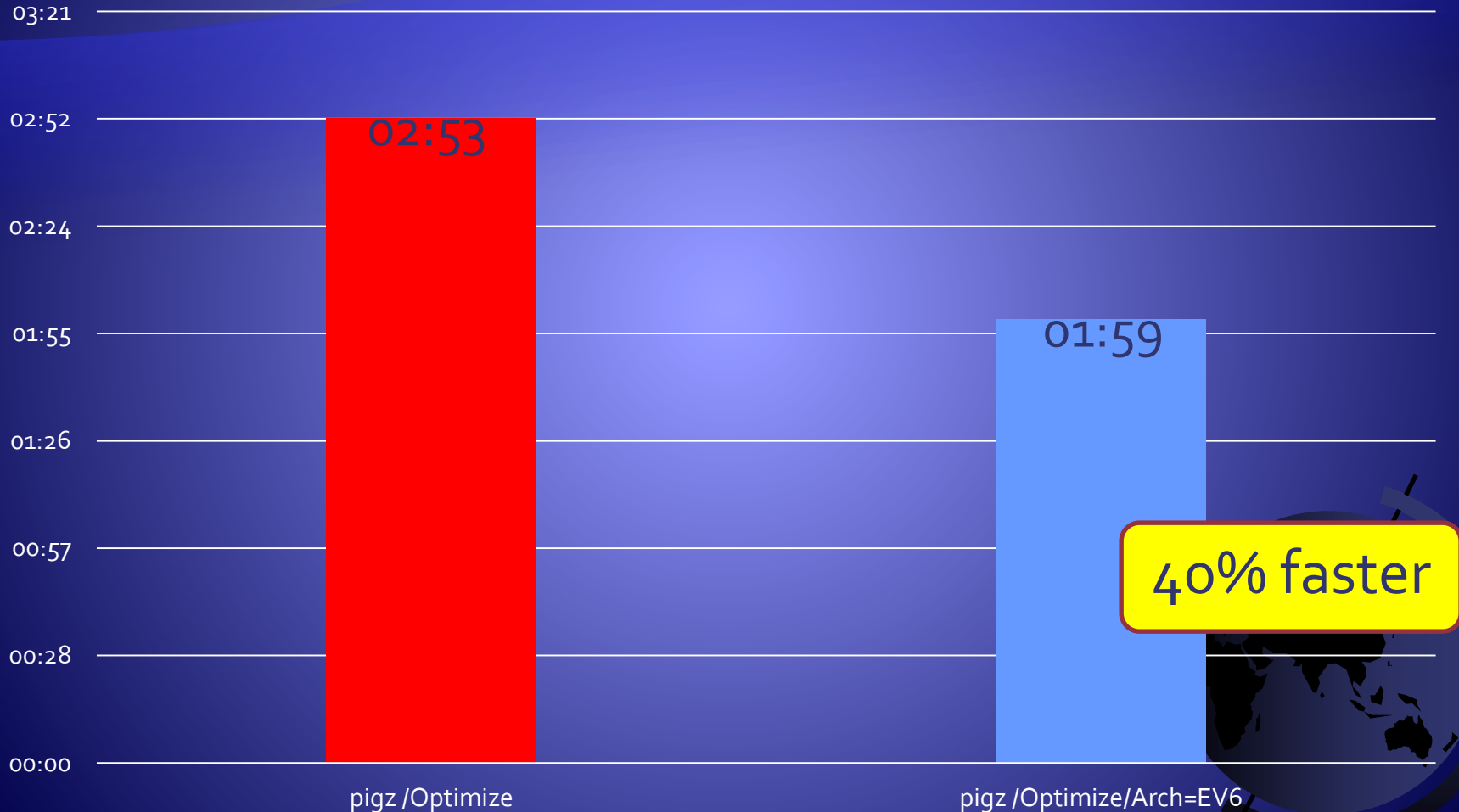


# Examples : SCI Tuned



# 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



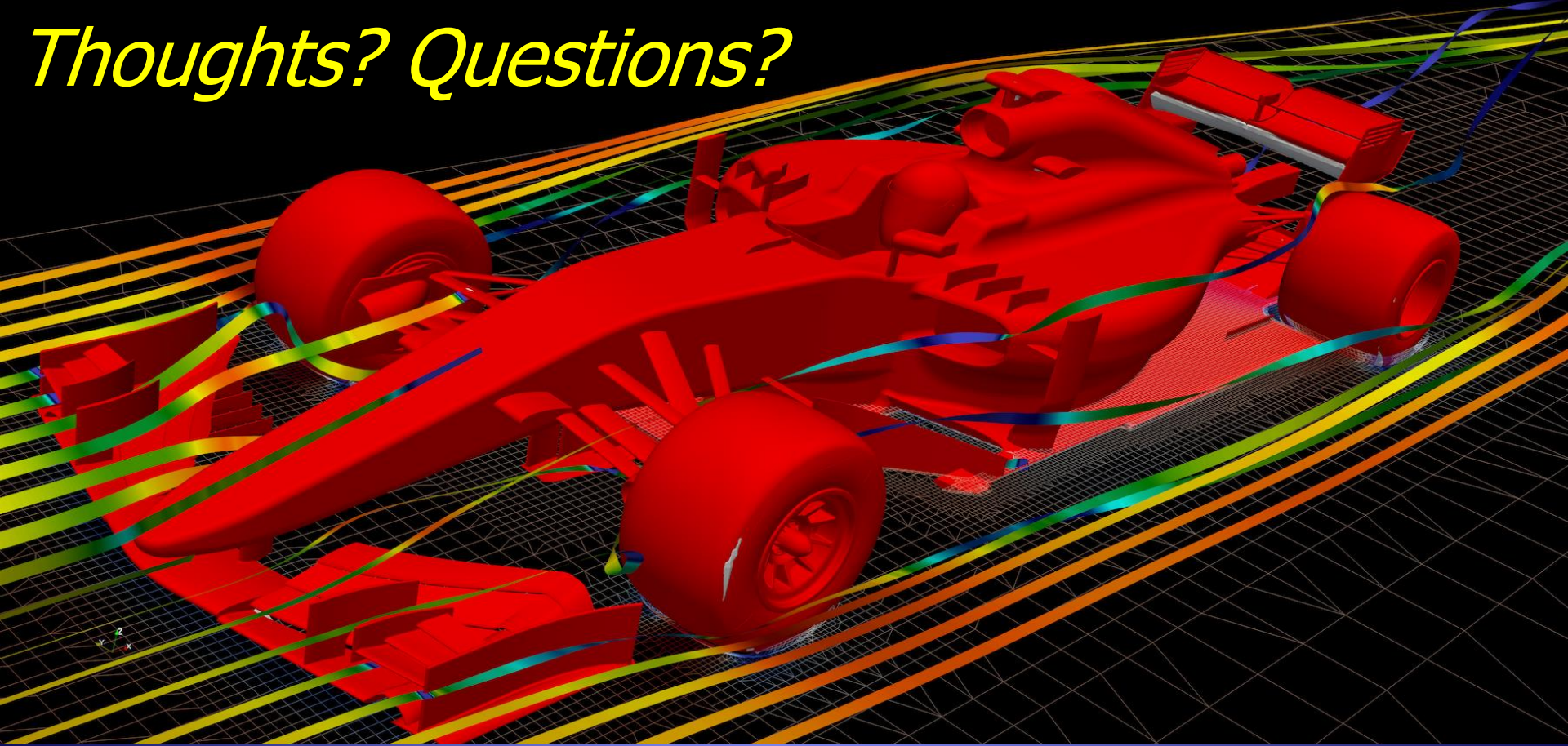
# Summary

- ◆ 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?*



For SCI, OpenVMS, VSI,  
Rdb, Charon, Cloud :

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# Credits & Extra Special Thanks

- ◆ Boris Ovsyankin
- ◆ Brad McCusker
- ◆ Bryan Holland
- ◆ Christian Moser
- ◆ Dave Sweeney
- ◆ Doug Gordon
- ◆ Eduardo Serrat
- ◆ Greg Guthman
- ◆ Greg Reut
- ◆ Ian Smith
- ◆ John Prot
- ◆ John Reagan
- ◆ Kevin Duffy
- ◆ 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

