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Executive Overview M7 and SuperCluster M7 Part 2

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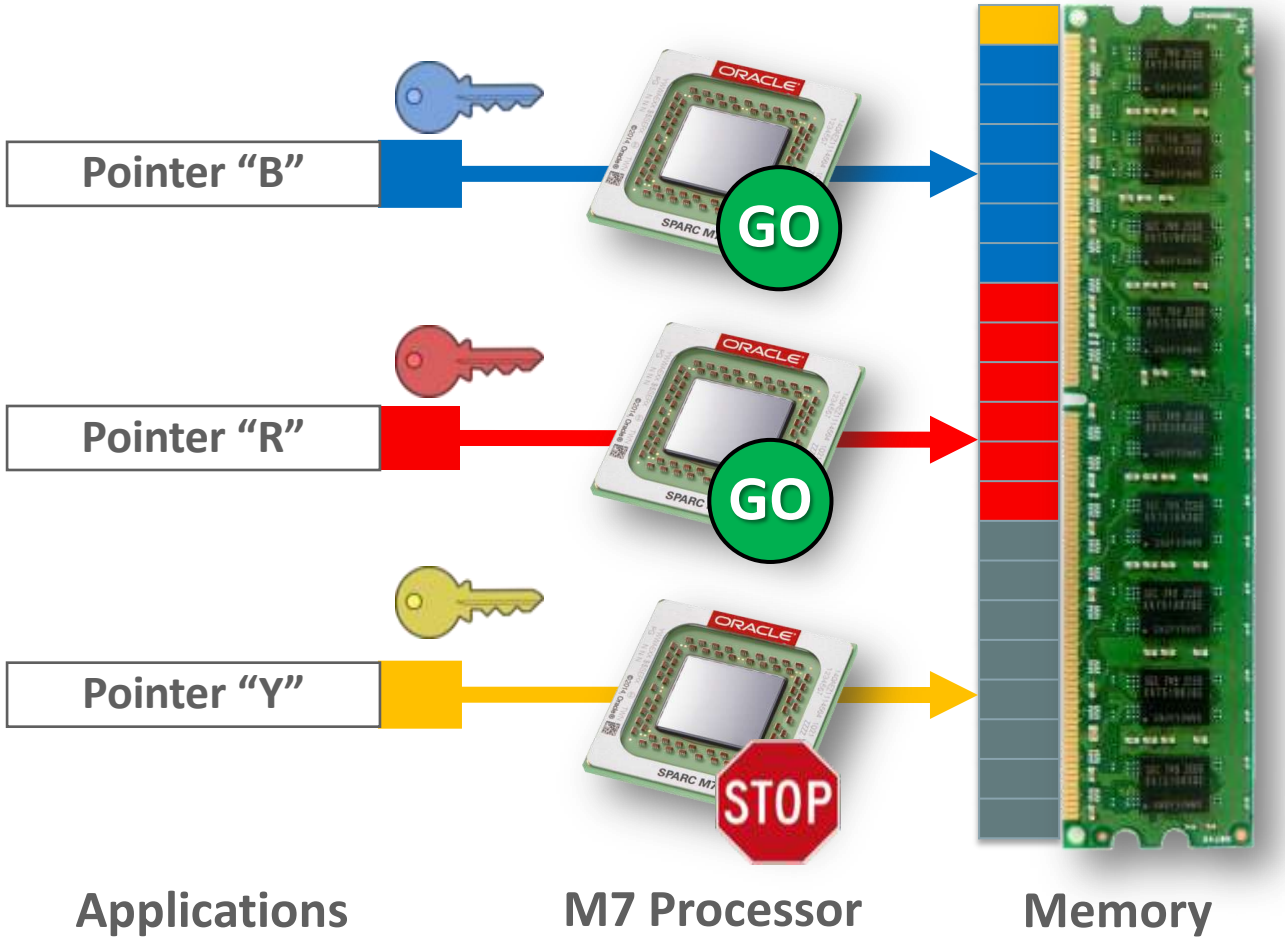
Security In Silicon: Silicon Secured Memory

- **Protects data in memory**
- Hidden “color” bits added to *pointers* (key), and content (lock)
- Pointer color (key) must match content color or program is aborted
  - Set on *memory allocation*, changed on *memory free’*
  - Protects against *access off end of structure*, *stale pointer* access and malicious attacks



A Couple Famous Examples: Heartbleed & Venom

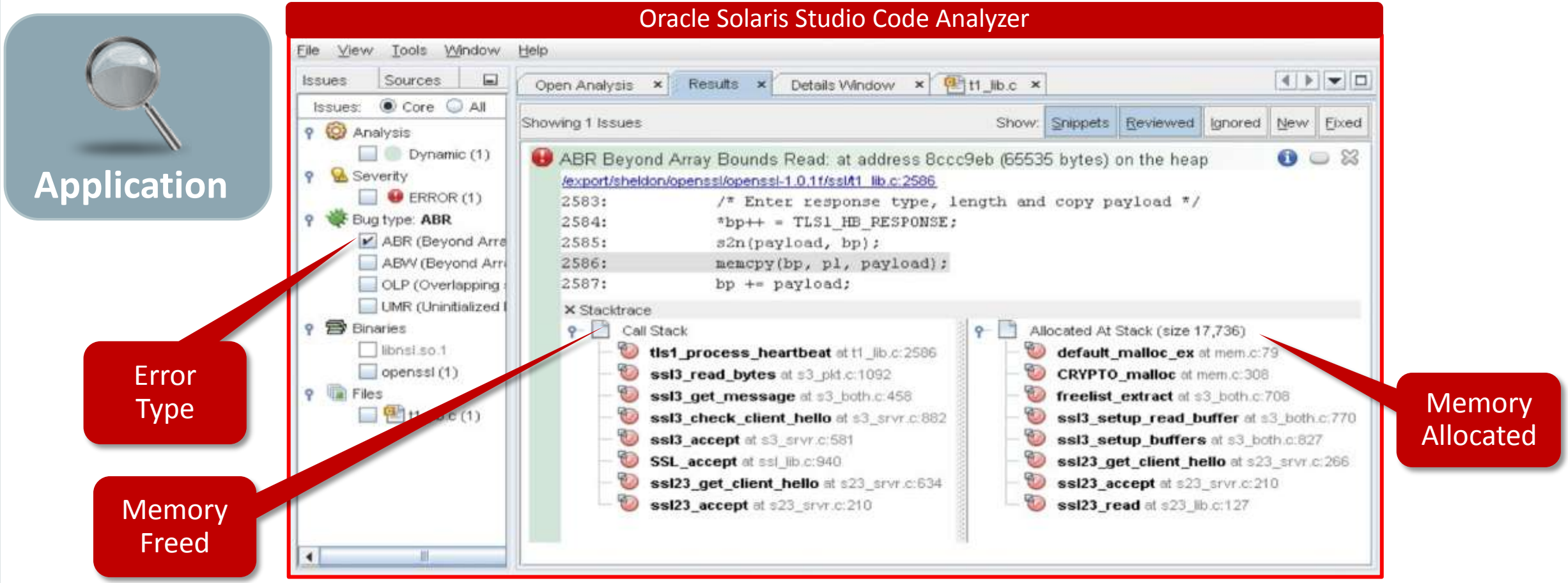
Silicon Secured Memory protection from read and write attacks

Buffer Over-Read Attack

Buffer Over-Write Attack

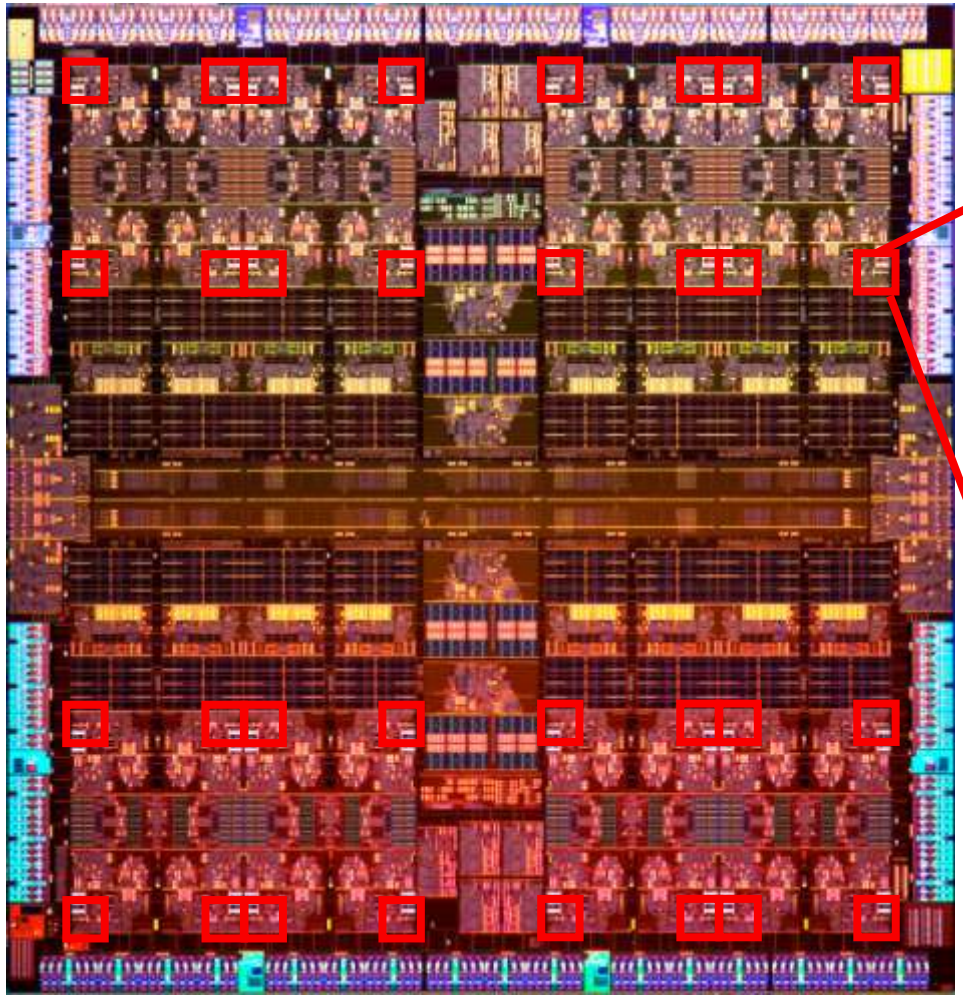
Developer Tools to Find and Fix Memory Access Errors

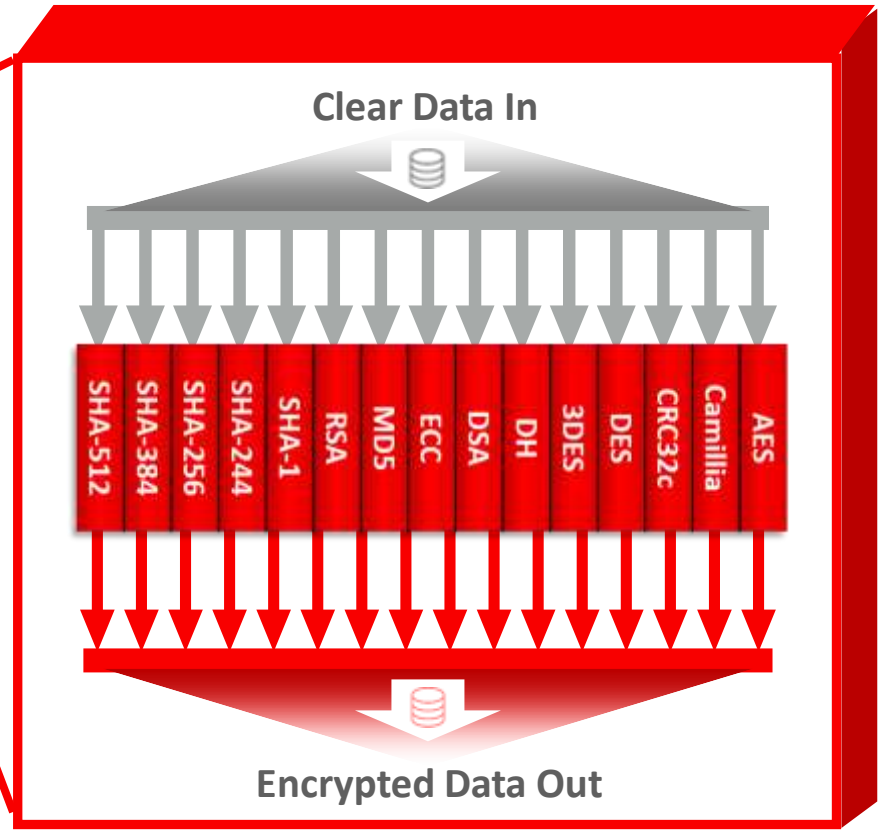
Provides Developers Additional Diagnostics



Hardware Accelerated Cryptography

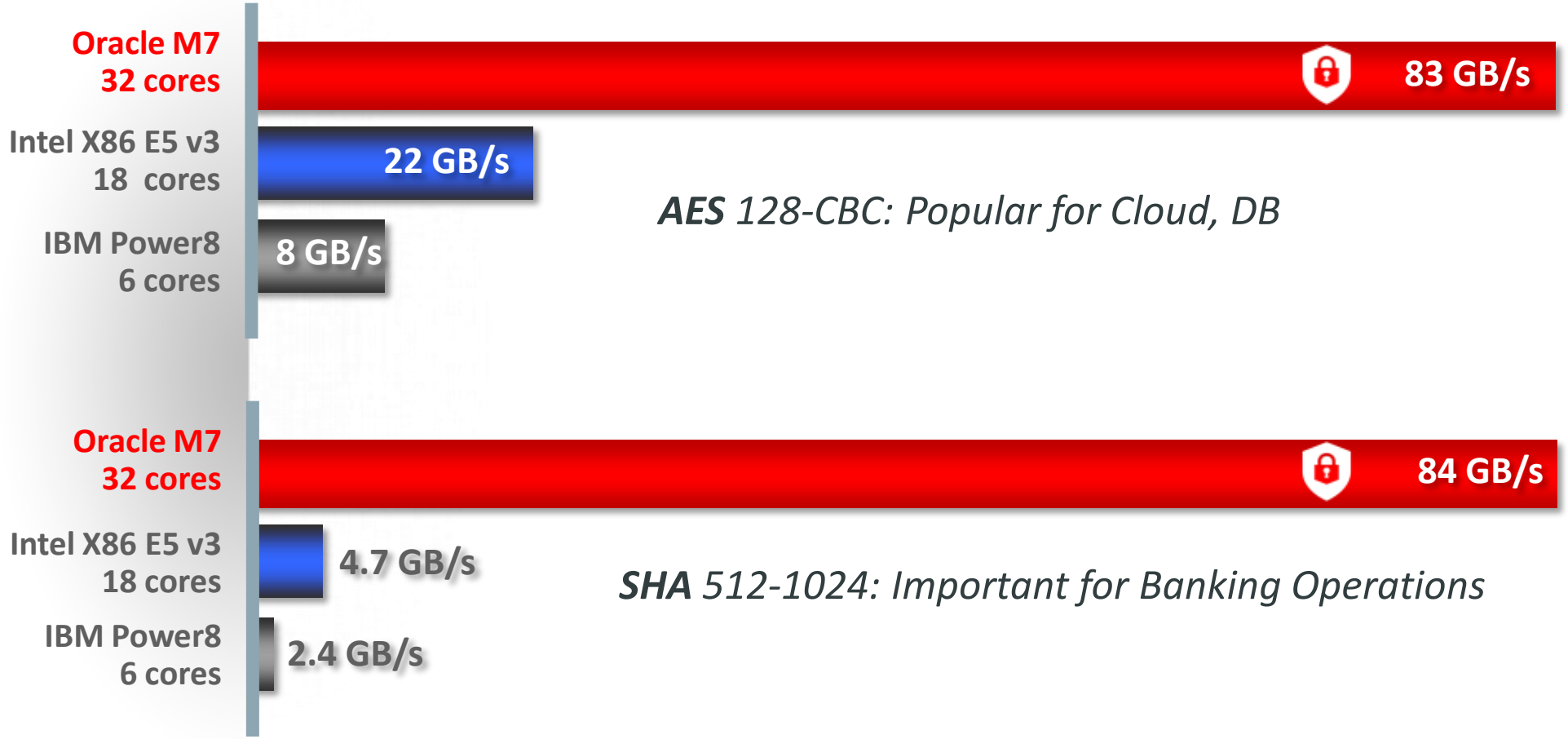
32 Crypto Accelerators with the broadest set of ciphers





Oracle M7: Much Faster End-To-End Encryption

M7 Advantage Increases on Highest Security Ciphers



4X Faster vs. X86

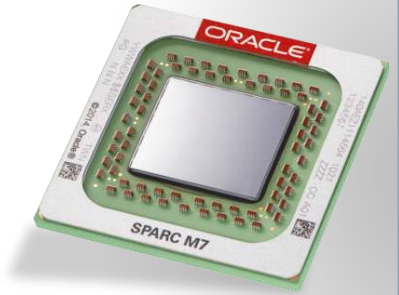
11X Faster vs. IBM Power

18X Faster vs. X86

35X Faster vs. IBM Power

Security in Silicon: Encryption Acceleration

Secure multi-tier enterprise database and Java performance delivered



Secure

Nominal Performance Impact
Zero Additional Hardware Cost

Unprotected

Near Zero Performance Difference

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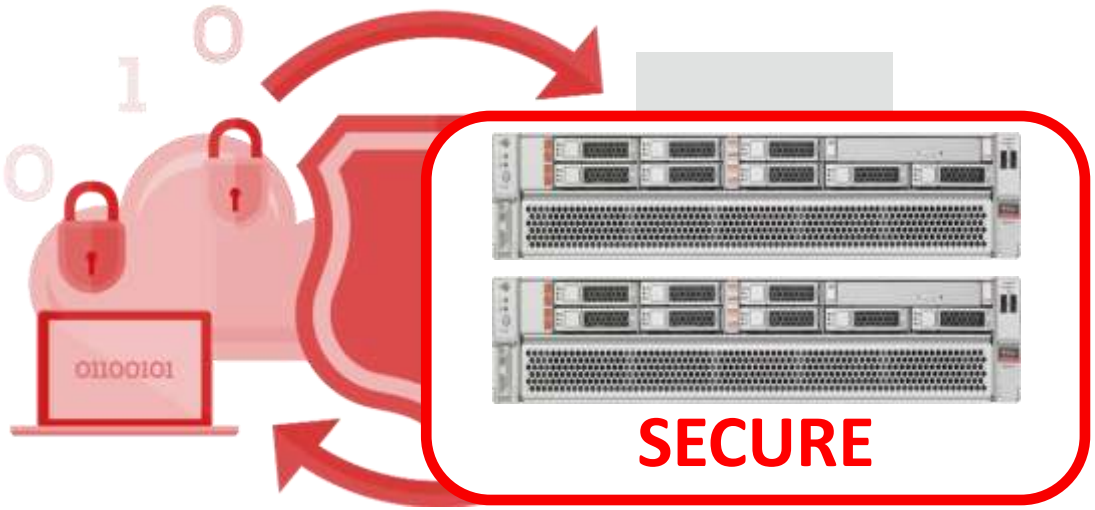
#1 Database And Java With End-To-End Security

SPECjEnterprise: Oracle M7 with Encryption is 4.5x Faster Than Power8 Processor

1st Place

25,093.06 EjOPS

2 processors



2nd Place

22,543.34 EjOPS

8 processors

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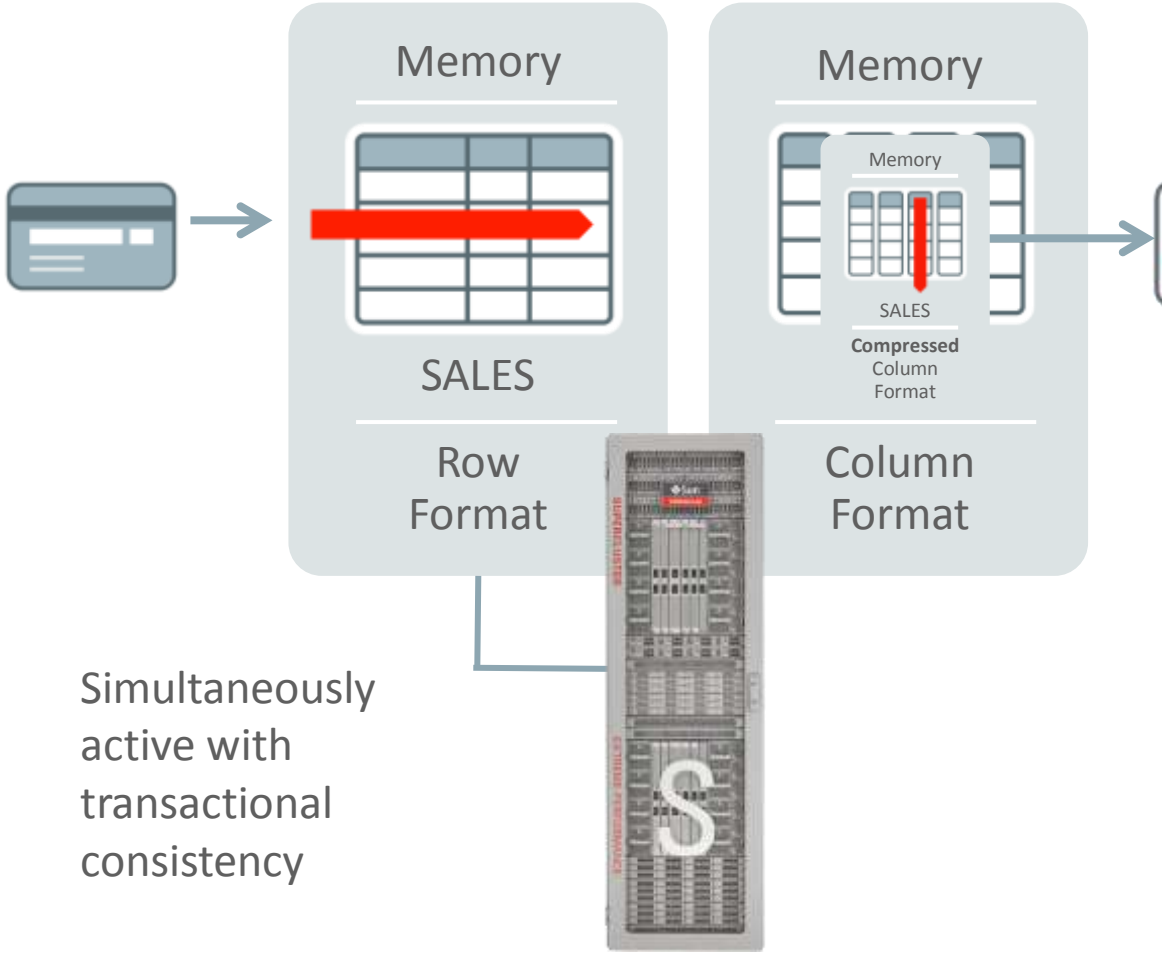
SuperCluster M7 and Oracle Database 12c:

Oracle M7 SQL in Silicon and In-line Memory Decompression



- up to **11x SQL Acceleration**
- up to **6x In-line Memory Decompression**

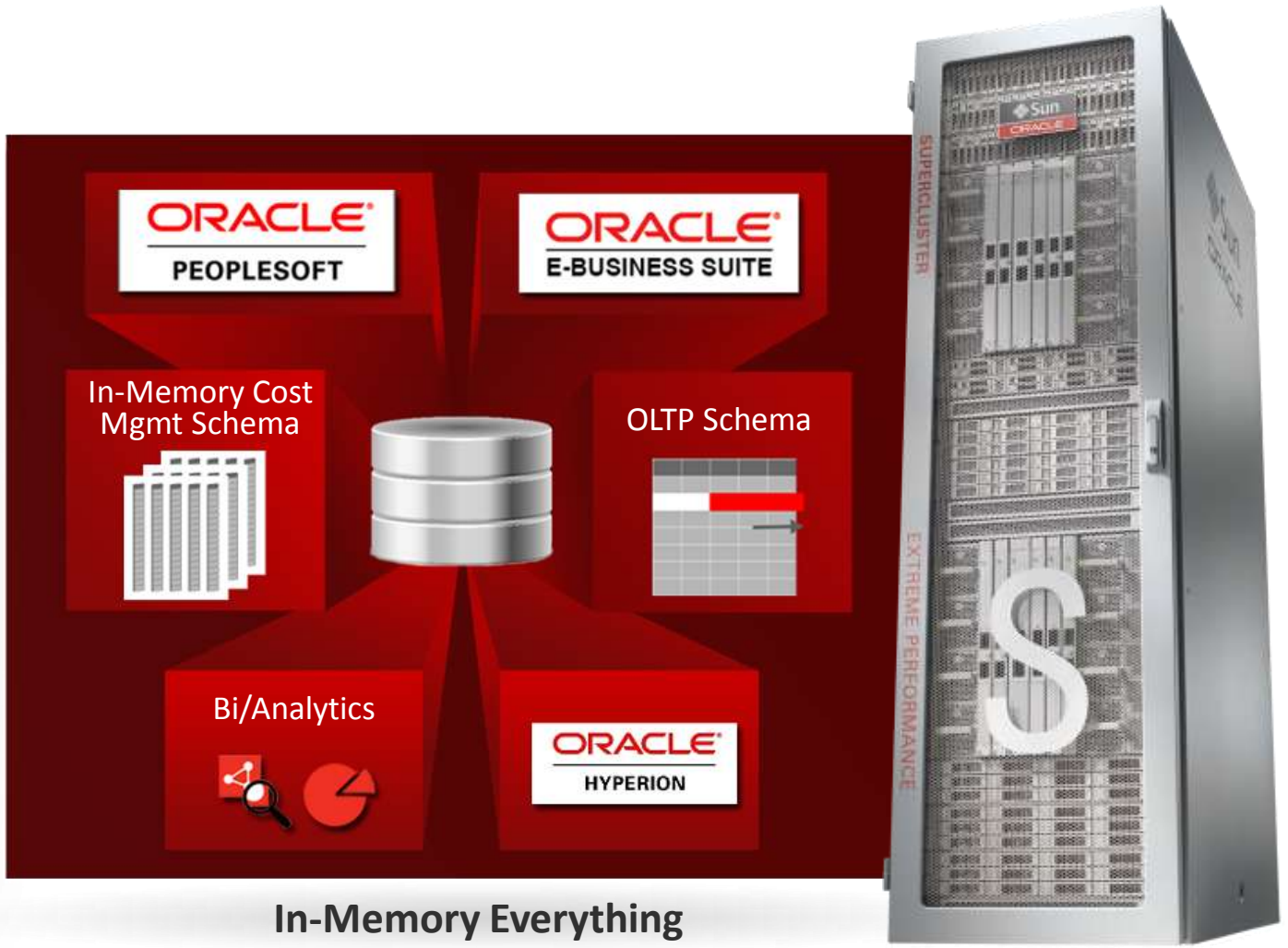
- ***Analytics & reporting use new in-memory Column format***
- **BOTH** row and column formats for same table are stored in memory
- OLTP uses proven row format

SuperCluster M7: Real-Time Enterprise

No More Overnight Batch and Real-time Analytics

Accelerate Your Business

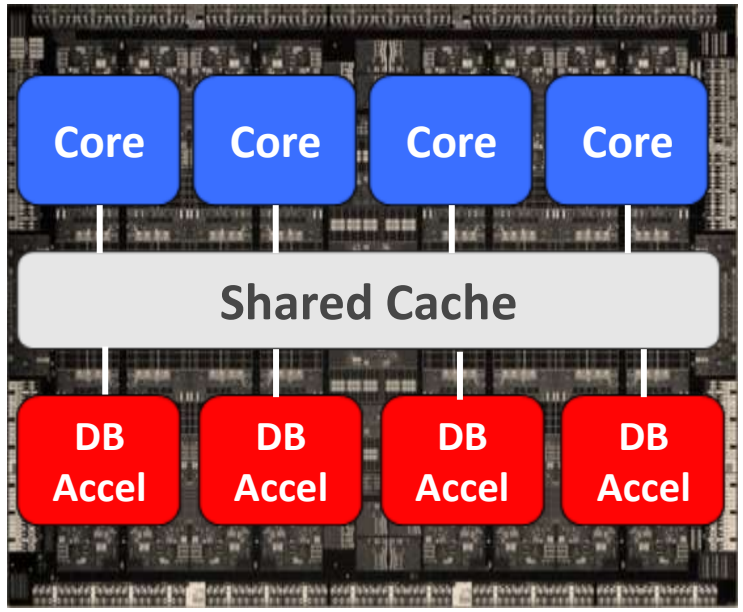
In-Memory Application Architecture



In-Memory Everything

SQL in Silicon: Database In-Memory Acceleration Engines

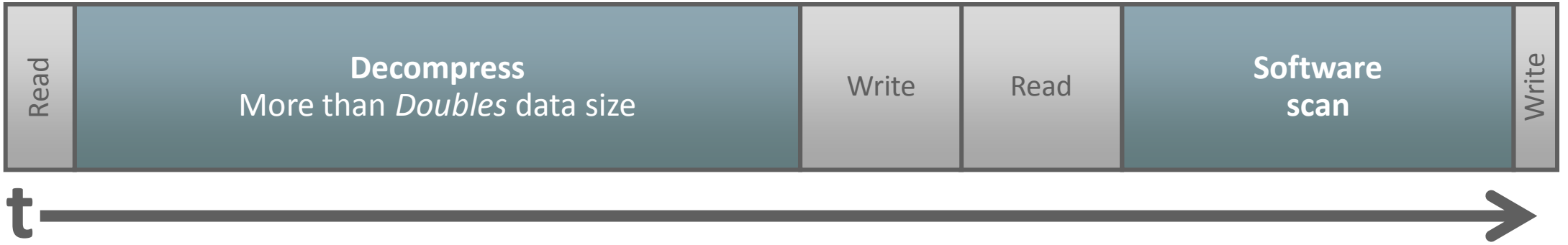
SPARC M7



- SIMD Vectors instructions are fast, but were designed for graphics, not database
- New SPARC M7 chip has 32 optimized database acceleration engines (DAX) built on chip
- Independently process streams of columns
  - E.g. find all values that match ‘California’
  - Up to 170 Billion rows per second!
- Like adding 32 additional specialized cores to chip
  - Using less than 1% of chip space

SQL In Silicon: Accelerating Oracle Database 12c

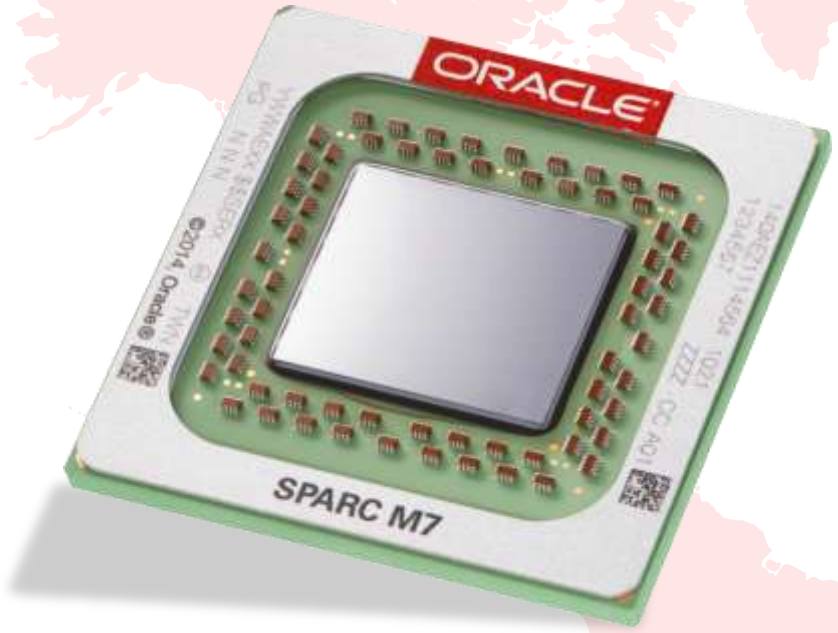
Decompress at memory speed >120 GB/sec



SQL:

```
SELECT count(*)
…WHERE lo_orderdate = d_datekey
…AND lo_partkey = 1059538
AND d_year_monthnum BETWEEN 201311 AND 201312;
```

SPARC M7: Setting 20 World Records in Performance



#1 SPECint_rate2006: 1,200 peak

#1 SPECfp_rate2006: 832 peak

#1 SPECjEnterprise2010: 25,093.06 EjOPs

#1 SAP-SD 2 processor: 30,800 SAPs

And more…

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The Beauty of Oracle Solaris 11

Oracle Solaris 11 IPS simplifies the customer experience => $cost savings

SRUs applied as a unit. No need to choose patches => $cost savings

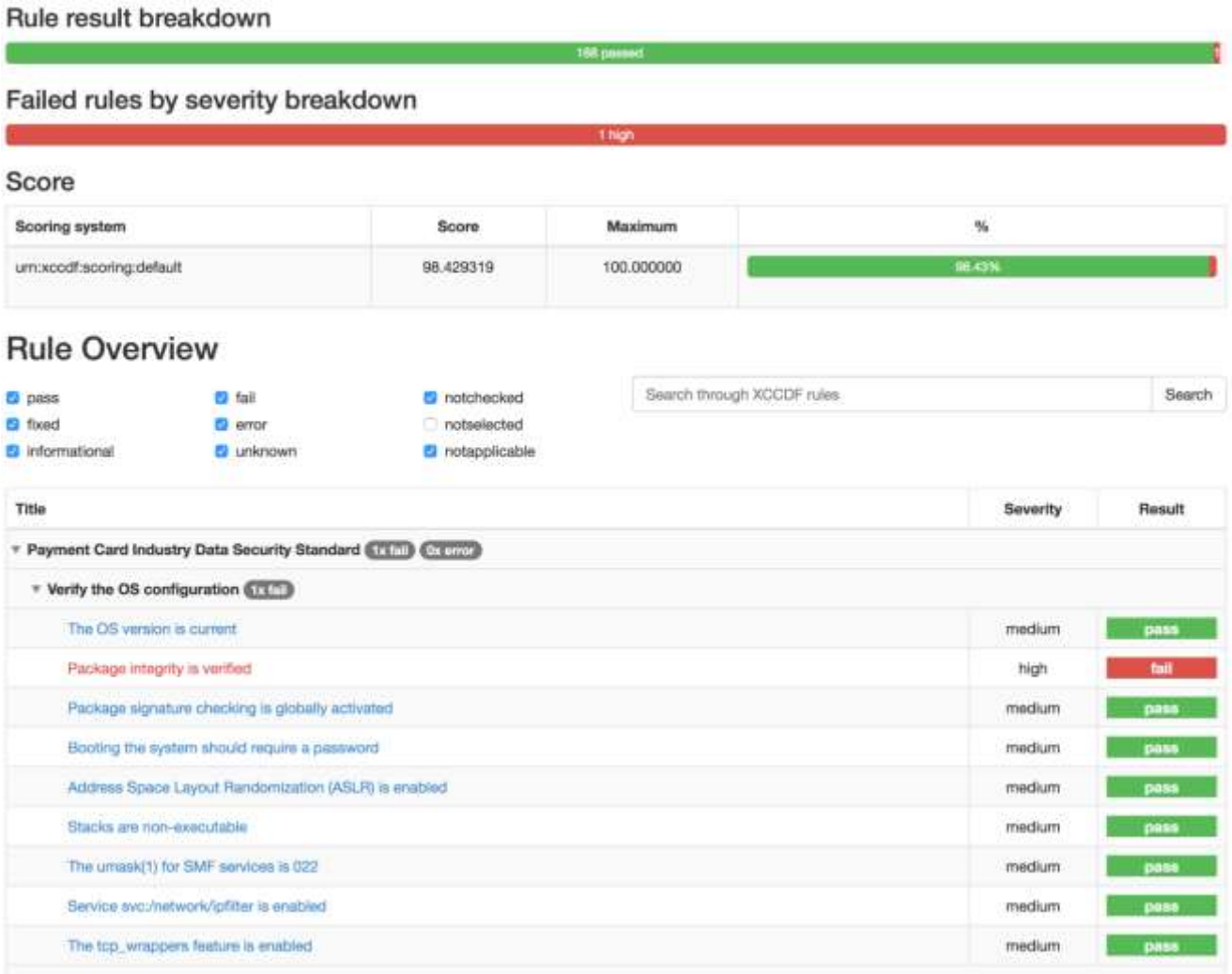
Safety-in-numbers with many customers running same SRU => $risk savings

Oracle Solaris 11 is feature rich – here's just a few security related features:

- Silicon Secured Memory
- solaris-minimal-install
- Compliance framework
- solaris-11-cpu CVE metadata package
- OSM for Oracle DB

Security IDRs

Simple Compliance Reporting



Rule result breakdown

168 passed

Failed rules by severity breakdown

1 high

Score

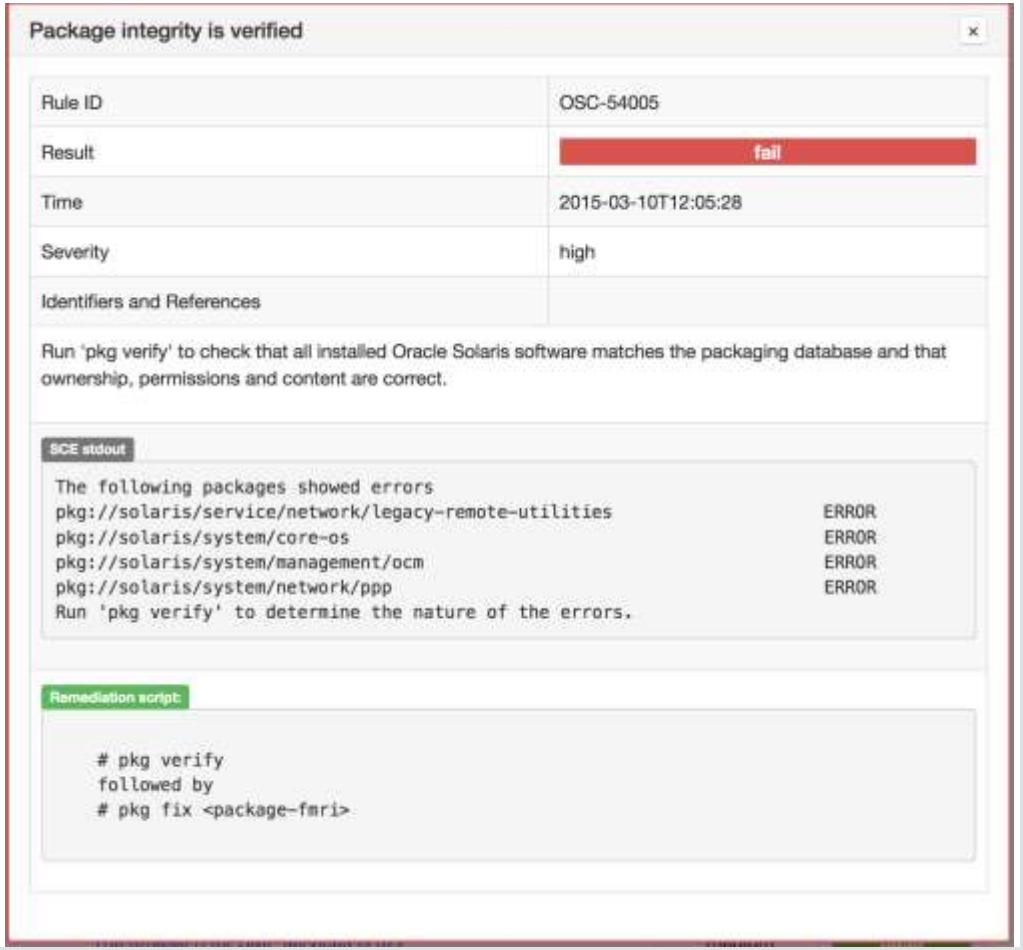
Scoring system	Score	Maximum	%
urn:xccdf:scoring:default	98.429319	100.000000	98.43%

Rule Overview

pass, fixed, informational, fail, error, unknown, notchecked, notselected, notapplicable

Search through XCCDF rules... Search

Title	Severity	Result
Payment Card Industry Data Security Standard (1x fail, 0x error)		
Verify the OS configuration (1x fail)		
The OS version is current	medium	pass
Package integrity is verified	high	fail
Package signature checking is globally activated	medium	pass
Booting the system should require a password	medium	pass
Address Space Layout Randomization (ASLR) is enabled	medium	pass
Stacks are non-executable	medium	pass
The umask(1) for SMF services is 022	medium	pass
Service svc:/network/ipfilter is enabled	medium	pass
The tcp_wrappers feature is enabled	medium	pass



Package integrity is verified

Rule ID	OSC-54005
Result	fail
Time	2015-03-10T12:05:28
Severity	high
Identifiers and References	

Run 'pkg verify' to check that all installed Oracle Solaris software matches the packaging database and that ownership, permissions and content are correct.

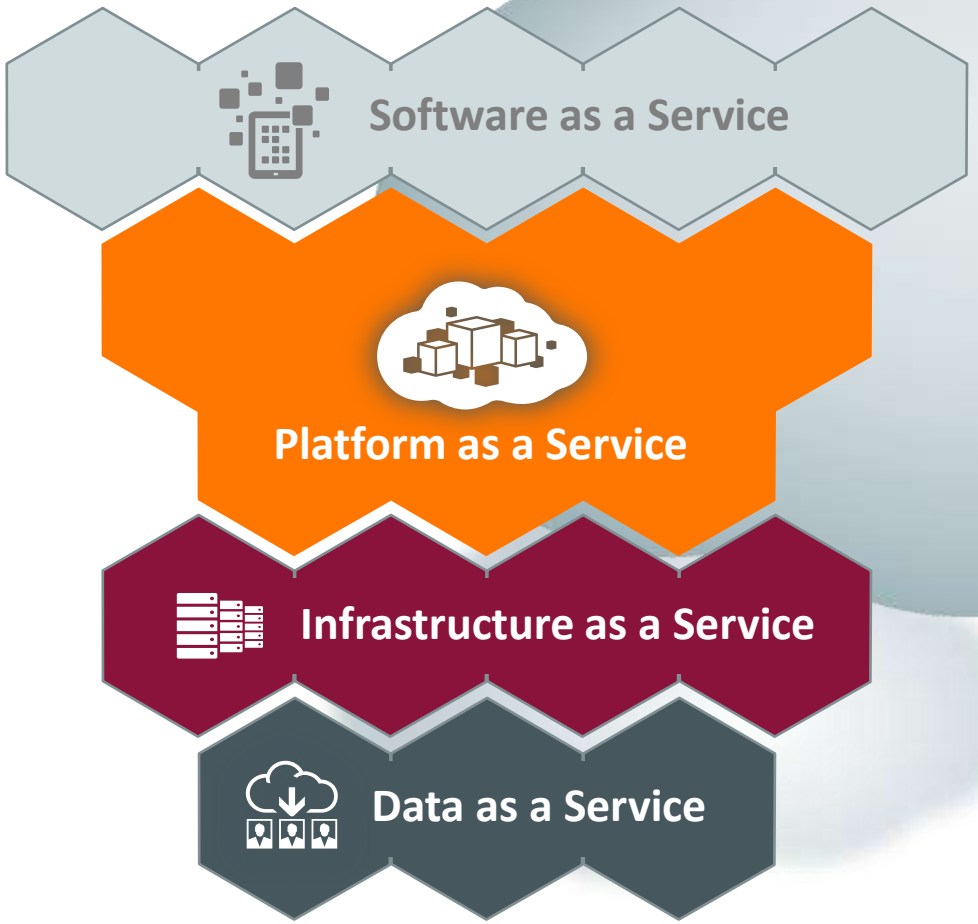
SCE stdout

```
The following packages showed errors
pkg://solaris/service/network/legacy-remote-utilities                ERROR
pkg://solaris/system/core-os                                         ERROR
pkg://solaris/system/management/ocm                                  ERROR
pkg://solaris/system/network/ppp                                     ERROR
Run 'pkg verify' to determine the nature of the errors.
```

Remediation script:

```
# pkg verify
followed by
# pkg fix <package-fmri>
```

Head in the Cloud…



On premise and in cloud are identical

- Migrate seamlessly from one to the other
- Dev and test in cloud, production on premise
- Off-site back-ups and Disaster Recovery in the cloud
- Or go the whole hog!

Public Cloud or Private Cloud

Technology Choice With Commercial Flexibility

Public Cloud

Oracle Public Cloud

Secure

Private Cloud

Oracle Engineered Systems

Benchmark Disclosure Statement

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- SPEC and the benchmark name SPECjEnterprise are registered trademarks of the Standard Performance Evaluation Corporation. Results from www.spec.org as of 10/25/2015. SPARC T7-1, 25,818.85 SPECjEnterprise2010 EjOPS (unsecure); SPARC T7-1, 25,093.06 SPECjEnterprise2010 EjOPS (secure); Oracle Server X5-2, 21,504.30 SPECjEnterprise2010 EjOPS (unsecure); IBM Power S824, 22,543.34 SPECjEnterprise2010 EjOPS (unsecure); IBM x3650 M5, 19,282.14 SPECjEnterprise2010 EjOPS (unsecure).
- SPEC and the benchmark name SPECvirt_sc are registered trademarks of the Standard Performance Evaluation Corporation. Results from www.spec.org as of 10/25/2015. SPARC T7-2, SPECvirt_sc2013 3026@168 VMs; HP DL580 Gen9, SPECvirt_sc2013 3020@168 VMs; Lenovo x3850 X6; SPECvirt_sc2013 2655@147 VMs; Huawei FusionServer RH2288H V3, SPECvirt_sc2013 1616@95 VMs; HP ProLiant DL360 Gen9, SPECvirt_sc2013 1614@95 VMs; IBM Power S824, SPECvirt_sc2013 1371@79 VMs.
- SPEC and the benchmark names SPECfp and SPECint are registered trademarks of the Standard Performance Evaluation Corporation. Results as of October 25, 2015 from www.spec.org and this report. 1 chip resultsSPARC T7-1: 1200 SPECint_rate2006, 1120 SPECint_rate_base2006, 832 SPECfp_rate2006, 801 SPECfp_rate_base2006; SPARC T5-1B: 489 SPECint_rate2006, 440 SPECint_rate_base2006, 369 SPECfp_rate2006, 350 SPECfp_rate_base2006; Fujitsu SPARC M10-4S: 546 SPECint_rate2006, 479 SPECint_rate_base2006, 462 SPECfp_rate2006, 418 SPECfp_rate_base2006. IBM Power 710 Express: 289 SPECint_rate2006, 255 SPECint_rate_base2006, 248 SPECfp_rate2006, 229 SPECfp_rate_base2006; Fujitsu CELSIUS C740: 715 SPECint_rate2006, 693 SPECint_rate_base2006; NEC Express5800/R120f-1M: 474 SPECfp_rate2006, 460 SPECfp_rate_base2006.
- SPEC and the benchmark name SPEC OMP are registered trademarks of the Standard Performance Evaluation Corporation. Results as of October 25, 2015 from www.spec.org and this report. SPARC T7-4 (4 chips, 128 cores, 1024 threads): 27.9 SPECompG_peak2012, 26.4 SPECompG_base2012; HP ProLiant DL580 Gen9 (4 chips, 72 cores, 144 threads): 21.5 SPECompG_peak2012, 20.4 SPECompG_base2012; Cisco UCS C460 M7 (4 chips, 72 cores, 144 threads): 20.8 SPECompG_base2012.
- Two-tier SAP Sales and Distribution (SD) standard application benchmarks, SAP Enhancement Package 5 for SAP ERP 6.0 as of 10/23/15: SPARC T7-2 (2 processors, 64 cores, 512 threads) 30,800 SAP SD users, 2 x 4.13 GHz SPARC M7, 1 TB memory, Oracle Database 12c, Oracle Solaris 11, Cert# 2015050. IBM Power System S824 (4 processors, 24 cores, 192 threads) 21,212 SAP SD users, 4 x 3.52 GHz POWER8, 512 GB memory, DB2 10.5, AIX 7, Cert#201401. Dell PowerEdge R730 (2 processors, 36 cores, 72 threads) 16,500 SAP SD users, 2 x 2.3 GHz Intel Xeon Processor E5-2699 v3 256 GB memory, SAP ASE 16, RHEL 7, Cert#2014033. HP ProLiant DL380 Gen9 (2 processors, 36 cores, 72 threads) 16,101 SAP SD users, 2 x 2.3 GHz Intel Xeon Processor E5-2699 v3 256 GB memory, SAP ASE 16, RHEL 6.5, Cert#2014032. SAP, R/3, reg TM of SAP AG in Germany and other countries. More info www.sap.com/benchmark
- Additional Info: http://blogs.oracle.com/bestperf