Praktische Erfahrungen mit SPARC S7-2 Server

Marcel Hofstetter

hofstetter@jomasoft.ch
https://jomasoftmarcel.blogspot.ch

CEO / Enterprise Consultant
JomaSoft GmbH

Oracle ACE „Solaris“

Agenda

- Wer ist JomaSoft?
- SPARC S7 CPU / Silicon Secured Memory & DAX
- SPARC S7-2 Server
- SPARC S7-2 bei JomaSoft
- SPARC S7 Projekte

Wer ist JomaSoft?

ORACLE Gold Partner
Specialized
Oracle Solaris 11

ORACLE Gold Partner
Specialized
SPARC T-Series Servers

- Software Unternehmen gegründet im Juli 2000
- Spezialisiert im Bereich **Solaris,**
  Software Entwicklung & Services/Beratung
- Produkt **VDCF** (Virtual Datacenter Cloud Framework):
  Installation, Management, Betrieb, Monitoring, Security und DR von Solaris 10/11, sowie Virtualisierung mittels LDoms und Solaris Zonen
- VDCF wird seit 2006 produktiv in Europa genutzt

Love Work Play Mobistar

bmvit Bundesministerium für Verkehr, Innovation und Technologie

Zürcher Kantonalbank

swisscom

NOTENSTEIN PRIVATBANK

LOTERIE ROMANDE

VOLKSBANK LIECHTENSTEIN

Marcel Hofstetter

Informatiker seit 25+ Jahren
Solaris seit 20 Jahren
CEO bei der JomaSoft GmbH seit 18 Jahren

Internationaler Speaker:
Oracle OpenWorld, DOAG, UKOUG, SOUG, AOUG

Oracle ACE „Solaris“

SOUG (Swiss Oracle User Group) – Speaker of the Year 2016

Hobby: Familie, Reisen, Wine & Dine, Kino

https://www.linkedin.com/in/marcelhofstetter

https://twitter.com/marcel_jomasoft

https://jomasoftmarcel.blogspot.ch

Oracle SPARC CPUs compared

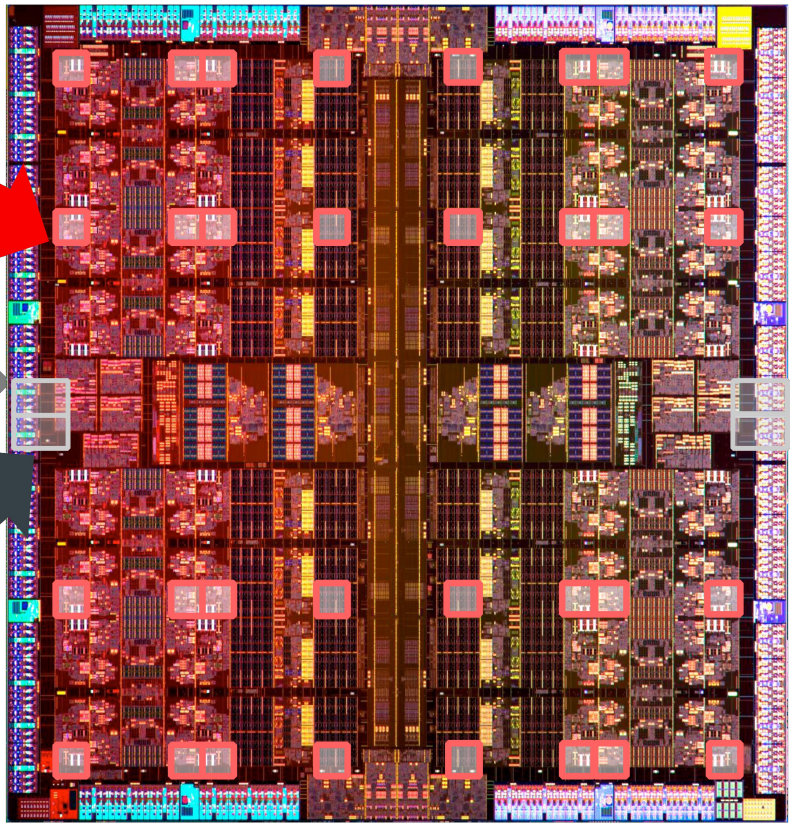
	SPARC M8 (2017)	SPARC S7 (2016)	SPARC M7 (2015)	SPARC T5 (2013)
Processor Cores	32 (5th Gen)	8 (4th Gen)	32 (4th Gen)	16 (3rd Gen)
Cache per Core	2 MB	2 MB	2 MB	0.5 MB
Memory Bandwidth per Core	5.6 GB/sec	6.0 GB/sec	5.3 GB/sec	5.0 GB/sec
Memory Access	127ns	97ns	131ns	163ns
I/O Bandwidth	145 GB/sec	32 GB/sec	145 GB/sec	32 GB/sec
CPU Frequency	5.0 GHz	4.27 GHz	4.13 GHz	3.6 GHz

Oracle SPARC M7/8 & S7 CPU

Security in Silicon:
Silicon Secured Memory
Cryptography Acceleration

SQL in Silicon:
Database In Memory Accelerator Engines

Capacity in Silicon:
Decompression Engines



SPARC – Silicon Secured Memory

- In den SPARC CPU M7/M8 und S7 integriert
- Damit entdeckt und verhindert man

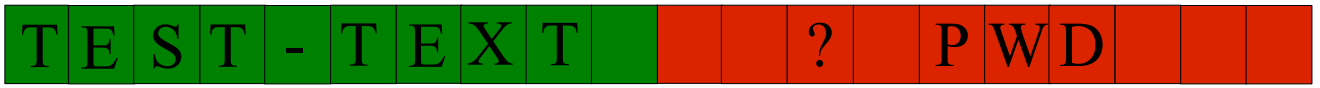
  - Memory Referenz Fehler
  - Buffer Overruns
  - Memory Nutzung nach Freigabe
- Alternativen in Software sind teuer und 30x – 70x mal langsamer
- Oracle Developer Studio Compiler enthält Unterstützung für Discover während Entwicklung
- Demo Video zu OpenSSL Heartbleed

  https://swisdev.oracle.com/_files/ADI-Demo.html

SPARC – Silicon Secured Memory

```
void main(int argc, char *argv[])
{
   char *buffer = malloc( sizeof(char) * 10);
   strcpy(buffer, "Test-Text");
   for (int i = 0; i < 20; ++i)
      printf( "%c ", buffer[i] );
   printf("|\n");
   free(buffer);
}
```

```
/opt/solarisstudio12.4/bin/cc -m64 -g -o buffer_overrun buffer_overrun.c
```




```
-bash-4.4$ ./buffer_overrun
T e s t - T e x t           |
```

SPARC – Silicon Secured Memory

Mit SSM (ADI) aktiviert, wird Programm beendet und kann nicht auf fremdes Memory zugreifen

```
-bash-4.4$ LD_PRELOAD_64=/lib/64/libadimalloc.so.1 ./buffer_overrun
Segmentation Fault (core dumped)

-bash-4.4$ echo ::status | mdb core
debugging core file of buffer_overrun (64-bit) from g0072
file: /export/home/marcel/buffer_overrun
initial argv: ./buffer_overrun
threading model: native threads
status: process terminated by SIGSEGV (Segmentation Fault), pc=100000bb0
, ADI version d mismatch for VA ffffffff7e93ffc0
```

SPARC – Silicon Secured Memory

Entwickler untersucht mit Compiler Tools

```
LD_PRELOAD_64=/opt/developerstudio12.5/lib/compilers/sparcv9/libdiscoverADI.so ./
buffer_overrun
T e s t - T e x t                |
```

1. ABR: reading memory beyond array bounds at address 0x2fffffff7cc7e040

main() + 0x60 (line ~12) in "buffer_overrun.c"

```
 9:    strcpy(buffer, "Test-Text");
10:
11:    for (int i = 0; i < 20; ++i)
12:      printf( "%c ", buffer[i] );
13:    printf("|\n");
14:
15:    free(buffer);
```

was allocated at (0x2fffffff7cc7e000, 64 bytes):

main() + 0x10 (line ~7) in "buffer_overrun.c"

```
 4:
 5:  void main(int argc, char *argv[])
 6:  {
 7:    char *buffer = malloc( sizeof(char) * 10);
 8:
 9:    strcpy(buffer, "Test-Text");
10:
```

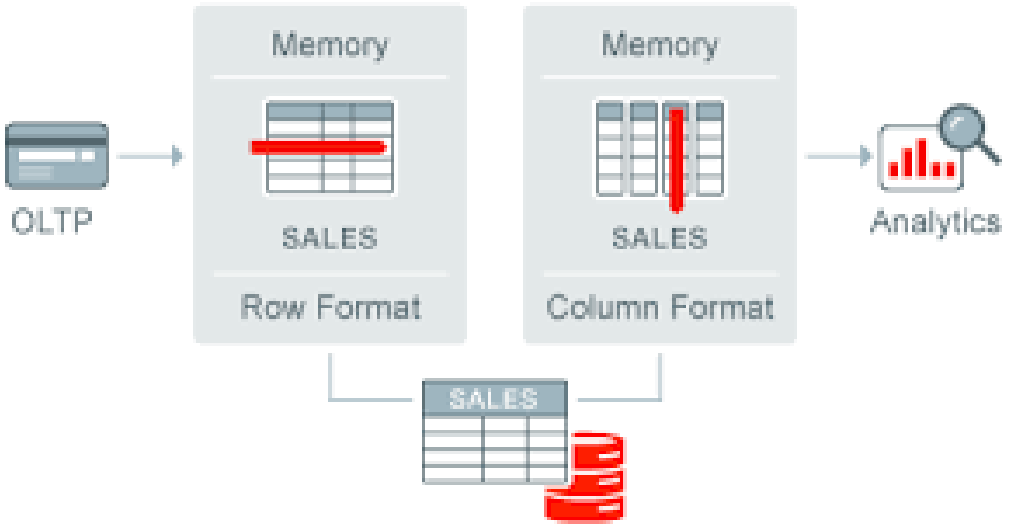
INMEMORY / DAX

Test Setup mit SLOB

```
SQL> show parameter inmemory_size
NAME                                 TYPE        VALUE
------------------------------------ ----------- ------------------------------
inmemory_size                        big integer 1G


SQL> ALTER TABLE USER1.CF1 INMEMORY;
Table altered.


SQL> select count(*) from USER1.CF1;
  COUNT(*)
----------
     10000
```



INMEMORY / DAX

Resultat / 8 Reader / 1 x SPARC S7-core

awr_0w_8r.20181107_165153.txt

DB Name	DB Id	Unique Name	DB Role	Edition	Release	RAC	CDB
SLOB	3718155087	SLOB	PRIMARY	EE	18.0.0.0.0	NO	NO

Host Name	Platform	CPUs	Cores	Sockets	Memory(GB)
v0133	Solaris[tm] OE (64-bit)	**8**	**1**	1	16.00

	Snap Id	Snap Time	Sessions	Curs/Sess
Begin Snap:	105	07-Nov-18 16:46:32	44	1.3
End Snap:	106	07-Nov-18 16:51:51	44	1.3
Elapsed:		5.31 (mins)		
DB Time:		42.12 (mins)		

Load Profile	Per Second	Per Transaction	Per Exec	Per Call
DB Time(s):	7.9	126.4	0.00	8.15
DB CPU(s):	7.9	125.4	0.00	8.09
Background CPU(s):	0.0	0.5	0.00	0.00
Redo size (bytes):	8,690.5	138,454.2		
Logical read (blocks):	**125,562,125.4**	**2,000,411,835.5**		
Block changes:	42.8	681.1		
Physical read (blocks):	0.6	10.1		
Physical write (blocks):	3.2	51.2		
Read IO requests:	0.3	5.2		
Write IO requests:	1.4	22.8		
Read IO (MB):	0.0	0.1		
Write IO (MB):	0.0	0.4		
IM scan rows:	125,536,275.3	2,000,000,000.0		
Session Logical Read IM:	125,536,275.3	2,000,000,000.0		
User calls:	1.0	15.5		

```
-bash-4.4$ grep offload awr_0w_8r.20181107_165153.txt
Statistic                                     Total     per Second     per Trans
IM simd compare HW offload calls          4,000,000       12,553.6     200,000.0
IM simd decode unpack HW offload          4,000,000       12,553.6     200,000.0
```

Resultat ohne INMEMORY / DAX

Resultat / 8 Reader / 1 x SPARC S7-core

awr_0w_8r.20181119_153421.txt

DB Name	DB Id	Unique Name	DB Role	Edition	Release	RAC	CDB
SLOB	3718155087	SLOB	PRIMARY	EE	18.0.0.0.0	NO	NO

Host Name	Platform	CPUs	Cores	Sockets	Memory(GB)
v0133	Solaris[tm] OE (64-bit)	8	1	1	16.00

	Snap Id	Snap Time	Sessions	Curs/Sess
Begin Snap:	277	19-Nov-18 15:21:56	49	.9
End Snap:	278	19-Nov-18 15:34:19	49	1.0
Elapsed:		12.38 (mins)		
DB Time:		98.54 (mins)		

Load Profile	Per Second	Per Transaction	Per Exec	Per Call
DB Time(s):	8.0	197.1	0.00	18.95
DB CPU(s):	7.9	195.3	0.00	18.78
Background CPU(s):	0.0	0.6	0.00	0.00
Redo size (bytes):	4,907.6	121,553.6		
Logical read (blocks):	1,386,001.4	34,328,851.4		
Block changes:	22.2	548.7		
Physical read (blocks):	27.3	675.		
Physical write (blocks):	1.2	28.9		
Read IO requests:	26.7	662.2		
Write IO requests:	0.6	13.6		

1.3 Mio read anstatt 125 Mio read

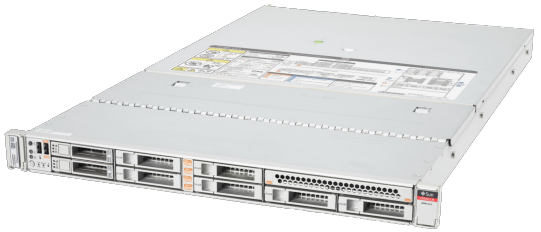
INMEMORY / DAX

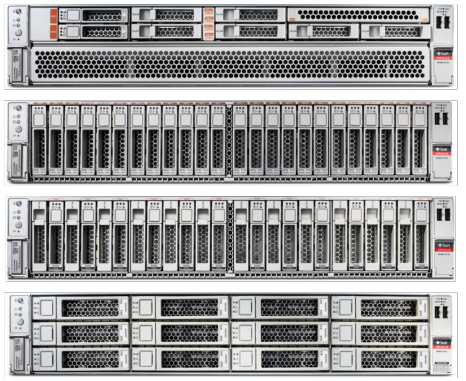
Spannend, dass die 1 core LDOM alle 4 DAX Units des SPARC S7 Socket verwenden kann

```
Host Name         Platform                          CPUs Cores Sockets Memory(GB)
----------------- --------------------------------- ---- ----- ------- ----------
v0133             Solaris[tm] OE (64-bit)             8     1       1      16.00


-bash-4.4$ daxstat 10
DAX    commands fallbacks    input    output %busy
  4       63809         0   106.1M      5.4M     0
  5       63810         0   106.1M      5.5M     0
  6       63810         0   106.1M      5.4M     0
  7       63803         0   106.1M      5.5M     0
```

Oracle SPARC S7 Server



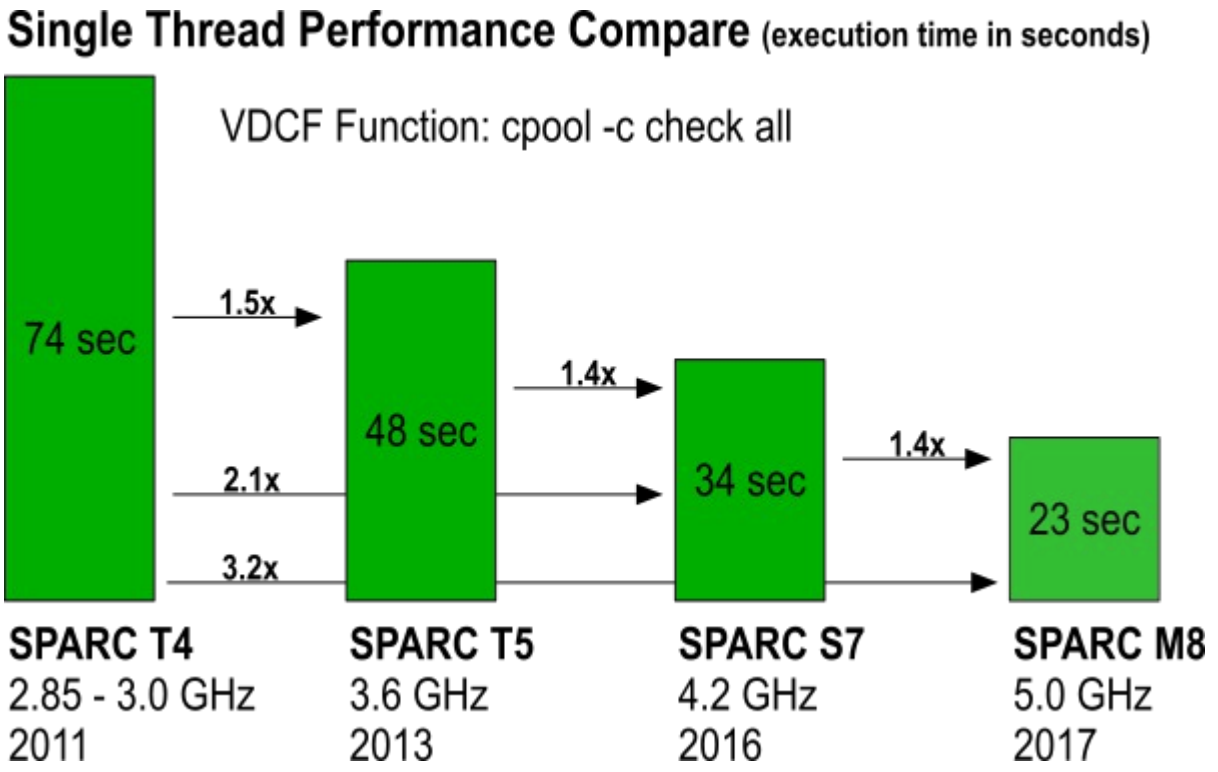


	S7-2	S7-2L
CPU	1-2	2
Cores	8/16	16
Threads	64/128	128
Max Memory	1 TB	1 TB
Size	1 RU	2 RU
PCI Slots	3 x PCIe 3.0	6 x PCIe 3.0

Oracle SPARC S7-2 Server

	S7-2 Klein	S7-2 Mittel
CPU	2	2
Cores	16	16
Disk	2 x 600 GB	2 x 600 GB
Memory	128 GB	512 GB
Preise	ca. 12K Euro	ca. 21K Euro

SPARC – Single Thread Performance



Benchmark von Oracle

SPECjEnterprise2010 (Java App & DB Server)

SPARC S7-2 / 512 GB
mit 16 cores 14,400 EjOPS 900 OPS pro Core

Oracle X6-2 / 256 GB
mit 44 cores 27'800 EjOPS 631 OPS pro Core

SPARC S7 43% besser bei core zu core Vergleich

Details:
https://blogs.oracle.com/bestperf/specjenterprise2010:-sparc-s7-2-secure-and-unsecure-results

https://www.spec.org/jEnterprise2010/results/jEnterprise2010.html

Benchmark von Oracle

SPECjEnterprise2010 (Java App & DB Server)

SPARC S7-2 / 512 GB
mit 16 cores 21K Euro EjOPS 900 OPS pro Core

Oracle X6-2 / 256 GB
mit 44 cores 15K Euro EjOPS 631 OPS pro Core

SPARC S7 43% besser bei core zu core Vergleich

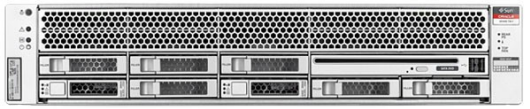
Details:
https://blogs.oracle.com/bestper

https://www.spec.org/jEnterprise2010/resu

Kostentreiber sind die App & DB Lizenzen!
Je weniger core, desto „günstiger“

JomaSoft Development T4 → S7

7 Jahre alt, läuft noch bestens

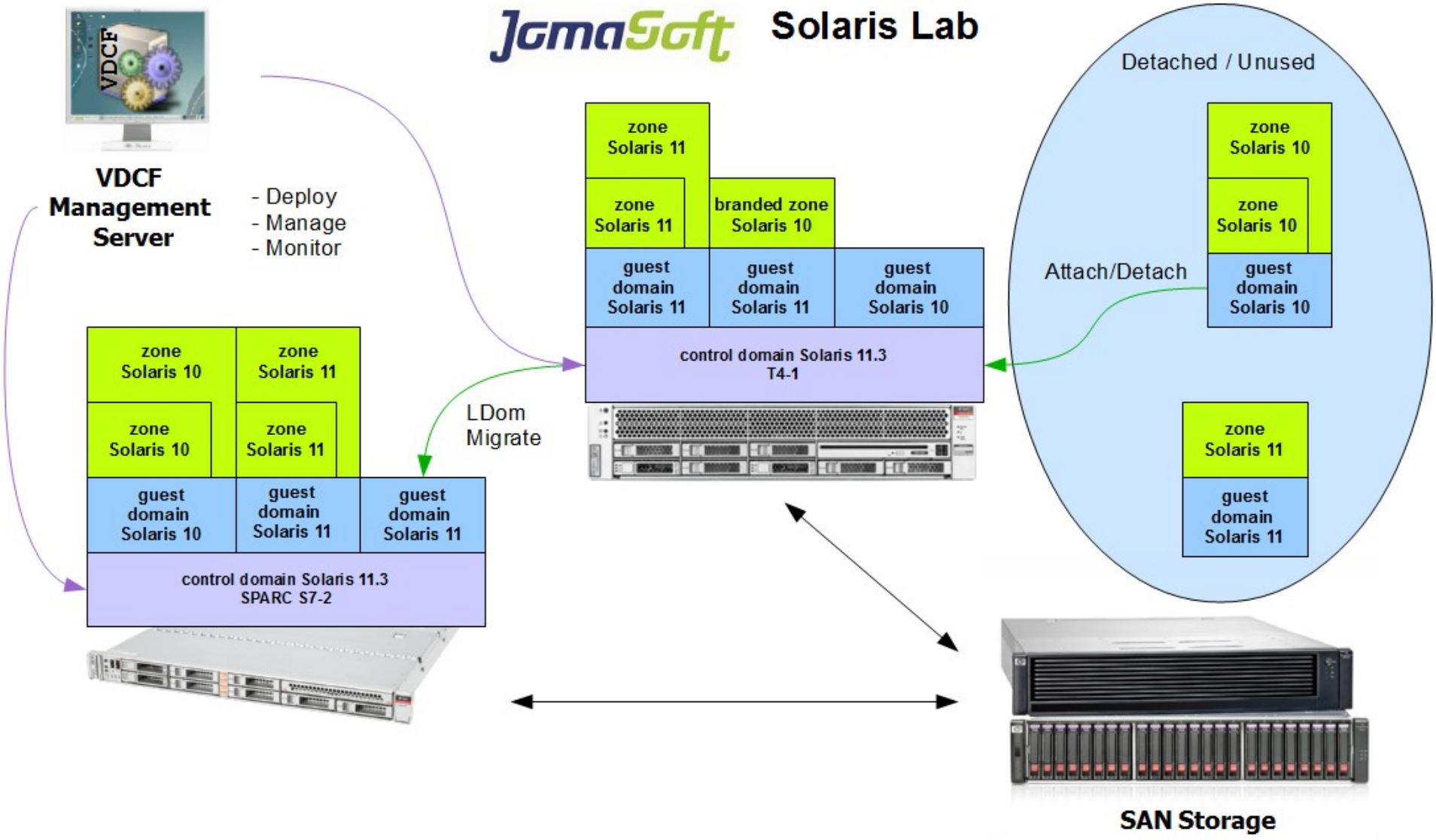


	T4-1	S7-2
CPU	1	2
Cores	8	16
Freq	2.85 GHz	4.27 GHz
Memory	32 GB	128 GB

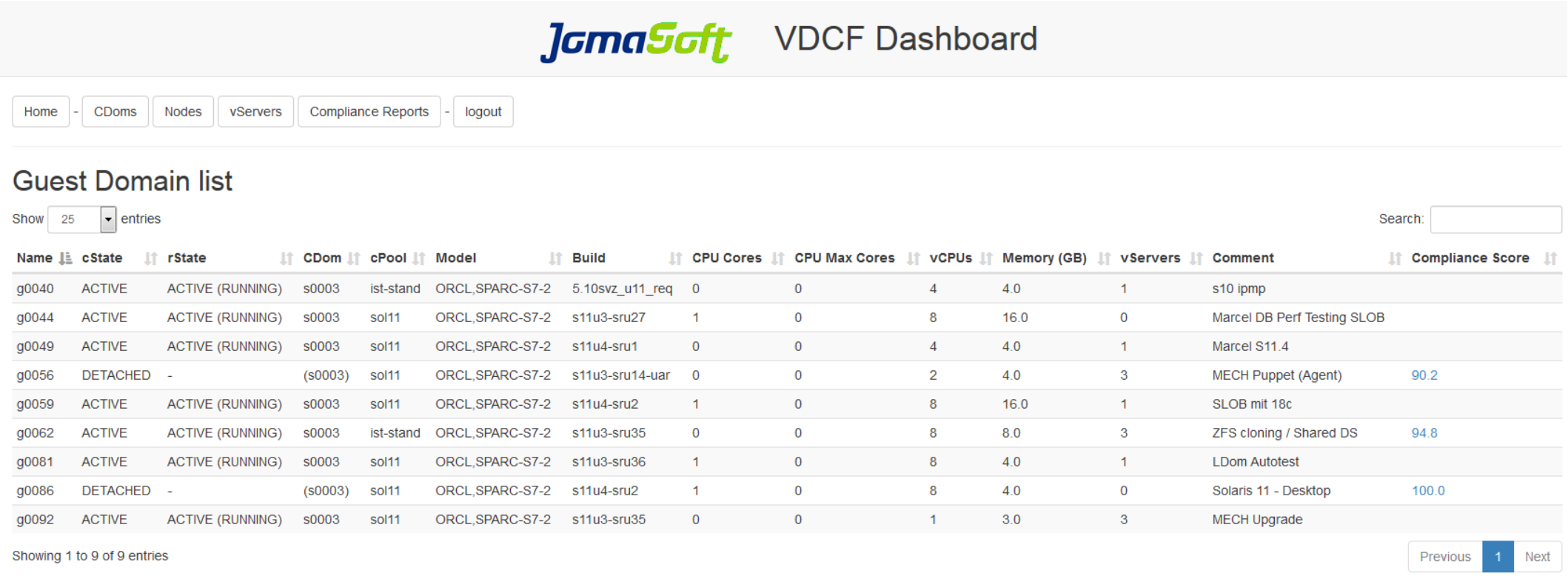
- Applikationsperformance: 2x

  (LDom mit 1 Core verwendet)

JomaSoft Development & Test

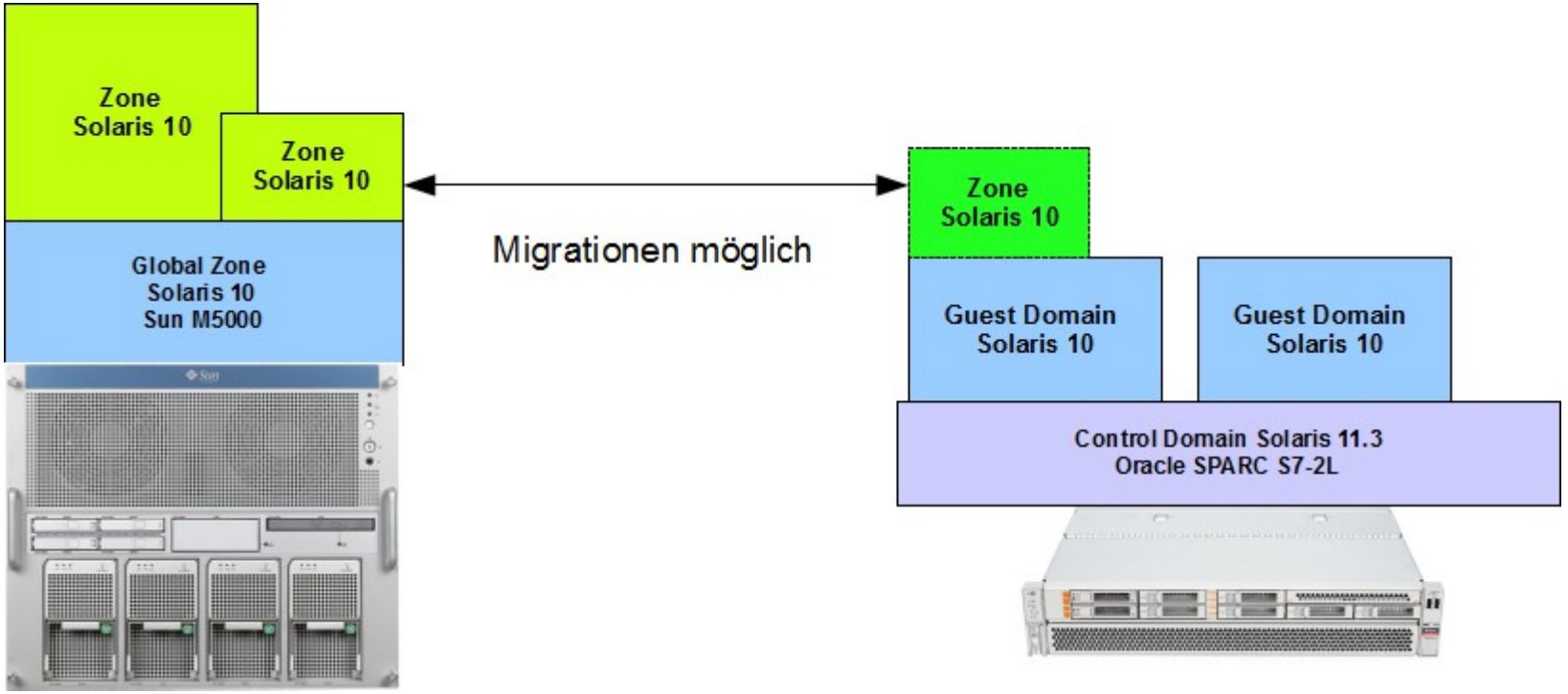


JomaSoft Development & Test



Name	cState	rState	CDom	cPool	Model	Build	CPU Cores	CPU Max Cores	vCPUs	Memory (GB)	vServers	Comment	Compliance Score
g0040	ACTIVE	ACTIVE (RUNNING)	s0003	ist-stand	ORCL,SPARC-S7-2	5.10svz_u11_req	0	0	4	4.0	1	s10 ipmp	
g0044	ACTIVE	ACTIVE (RUNNING)	s0003	sol11	ORCL,SPARC-S7-2	s11u3-sru27	1	0	8	16.0	0	Marcel DB Perf Testing SLOB	
g0049	ACTIVE	ACTIVE (RUNNING)	s0003	sol11	ORCL,SPARC-S7-2	s11u4-sru1	0	0	4	4.0	1	Marcel S11.4	
g0056	DETACHED	-	(s0003)	sol11	ORCL,SPARC-S7-2	s11u3-sru14-uar	0	0	2	4.0	3	MECH Puppet (Agent)	90.2
g0059	ACTIVE	ACTIVE (RUNNING)	s0003	sol11	ORCL,SPARC-S7-2	s11u4-sru2	1	0	8	16.0	1	SLOB mit 18c	
g0062	ACTIVE	ACTIVE (RUNNING)	s0003	ist-stand	ORCL,SPARC-S7-2	s11u3-sru35	0	0	8	8.0	3	ZFS cloning / Shared DS	94.8
g0081	ACTIVE	ACTIVE (RUNNING)	s0003	sol11	ORCL,SPARC-S7-2	s11u3-sru36	1	0	8	4.0	1	LDom Autotest	
g0086	DETACHED	-	(s0003)	sol11	ORCL,SPARC-S7-2	s11u4-sru2	1	0	8	4.0	0	Solaris 11 - Desktop	100.0
g0092	ACTIVE	ACTIVE (RUNNING)	s0003	sol11	ORCL,SPARC-S7-2	s11u3-sru35	0	0	1	3.0	3	MECH Upgrade	

Hardware Life Cycle Projekt



Ideale Voraussetzung, wenn Zonen existieren

Erledigt: - Setup von 2 x S7-2L
- Migration Zonen von 4 x M5000 Domains in 4 neue LDoms

Aufwand: 6 Tage

Praktische Erfahrungen mit SPARC S7-2 Server

Fragen?

Marcel Hofstetter

hofstetter@jomasoft.ch
https://jomasoftmarcel.blogspot.ch

CEO / Enterprise Consultant
JomaSoft GmbH

Oracle ACE „Solaris“

https://www.linkedin.com/in/marcelhofstetter

https://twitter.com/marcel_jomasoft

https://jomasoftmarcel.blogspot.ch

Weitere interessante Vorträge an der #DOAG2018

Mi, 21.11. 10:00 Raum Prag	„EU-DSGVO und Infrastruktur – ein Fazit nach 6 Monaten“ Jan Brosowski & Ralf Zenses
Do, 22.11. 09:00 Raum Hongkong	„Live Long And Prosper. Solaris 11.4 Vorteile“ Thomas Nau
Do, 22.11. 10:00 Raum Hongkong	„Oracle Solaris 11.4 and Beyond“ Joost Pronk & Jan Brosowski
Do, 22.11. 12:00 Raum Hongkong	„System Monitoring mit Solaris 11.4 DTrace und Analytics“ Thomas Nau
Do, 22.11. 13:00 Raum Hongkong	„SAP und Solaris 11.4 Erste Erfahrungen“ Andris Perkons & Jan Brosowski
Do, 22.11. 14:00 Raum Hongkong	„Was bringt Solaris 11.4“ Marcel Hofstetter