Das virtualisierte RZ

Mario Beck
Datacenter Architect
Sun Microsystems GmbH

Rechenzentren heute

Einzelne Anwendungen per Server

Zunehmend steigende Energiekosten

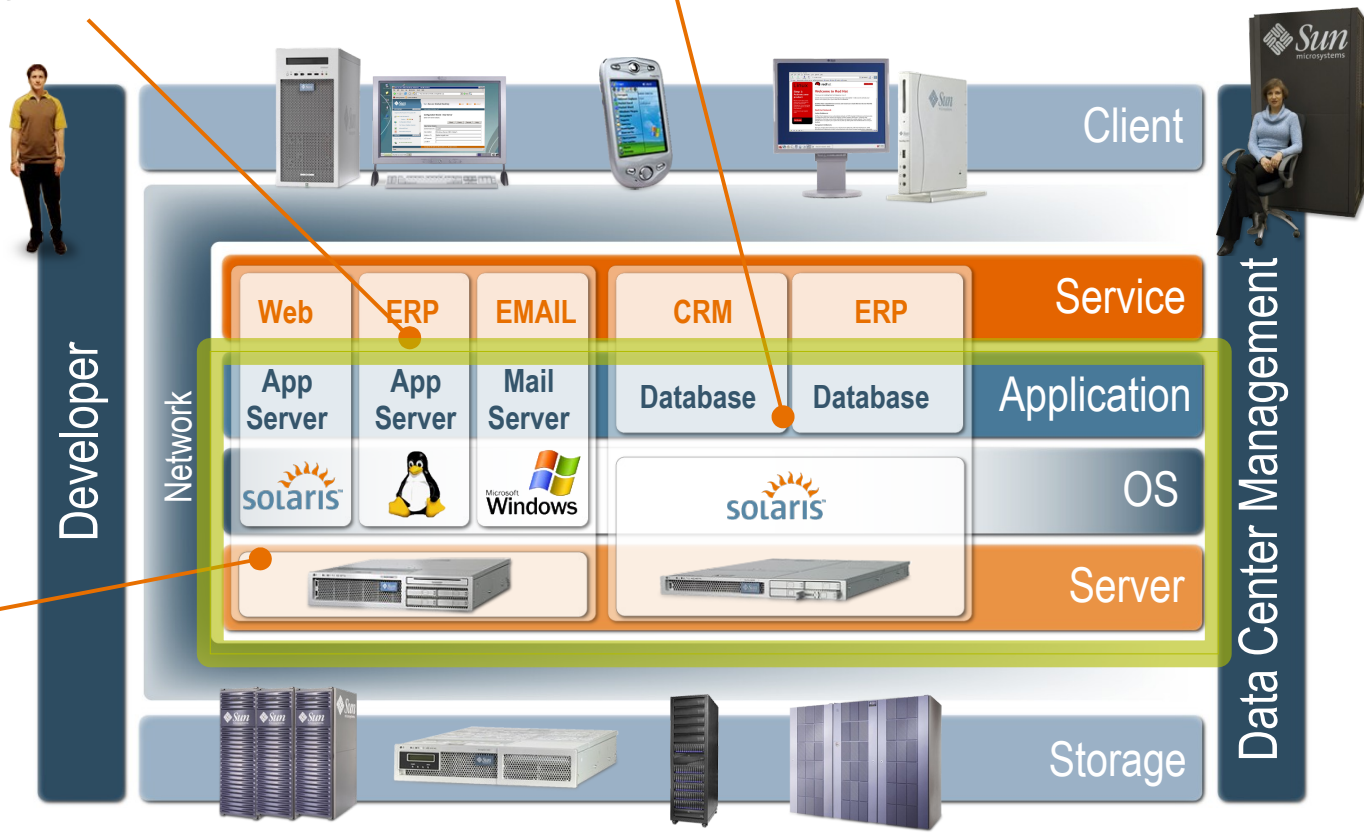
Schwierig zu verwaltende Systemlandschaft

Durchschnittliche Systemauslastung zwischen 5 - 15 %

Ziel: Das virtuelle Rechenzentrum

Prio 3: Schnell neue Anwendungen einführen

Prio 2: Garantiere Verfügbarkeit



Prio 1: Effektive Systemauslastung

Really virtual? Virtually real?

If you can see it,
and it is there,
it is REAL.

Really virtual? Virtually real?

If you cannot see it,
and it is there,
it is INVISIBLE.

Really virtual? Virtually real?

If you cannot see it,
and it is not there,
it is GONE.

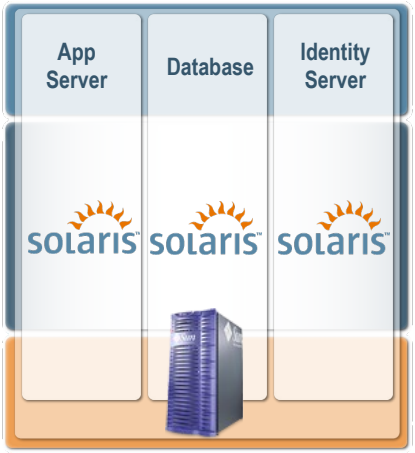
Really virtual? Virtually real?

If you can see it,
and it is not there,
it is VIRTUAL.

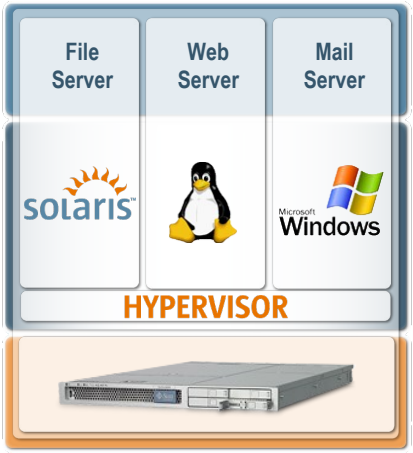
Wo wird virtualisiert?

Virtualisierung bei Sun

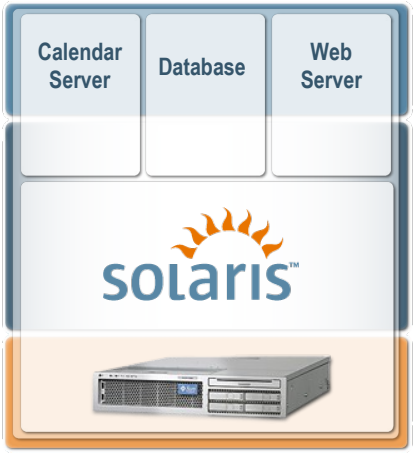
Hard Partitions



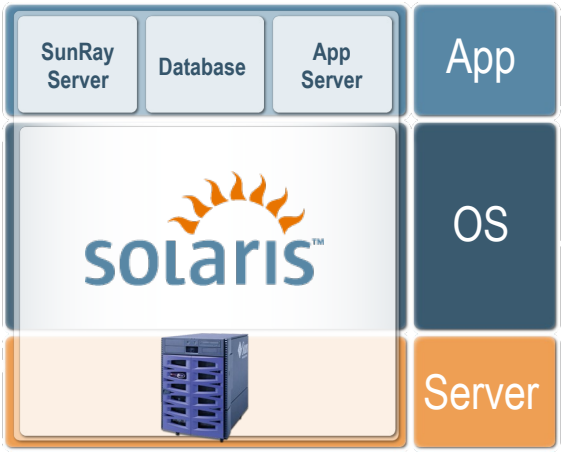
Virtual Machines



OS Virtualization



Resource Management



Multiple OSs ← → **Single OS**

Trend to flexibility → ← **Trend to isolation**

Dynamic System Domains

> Very High RAS
> Very Scalable
> Mature Technology
> Ability to run different OS versions

Logical Domains

xVM

VMware

Microsoft Virtual Server

Solaris Containers (Zones + SRM)

Solaris Trusted Extensions

Solaris Containers for Linux Applications

Solaris Resource Manager (SRM)

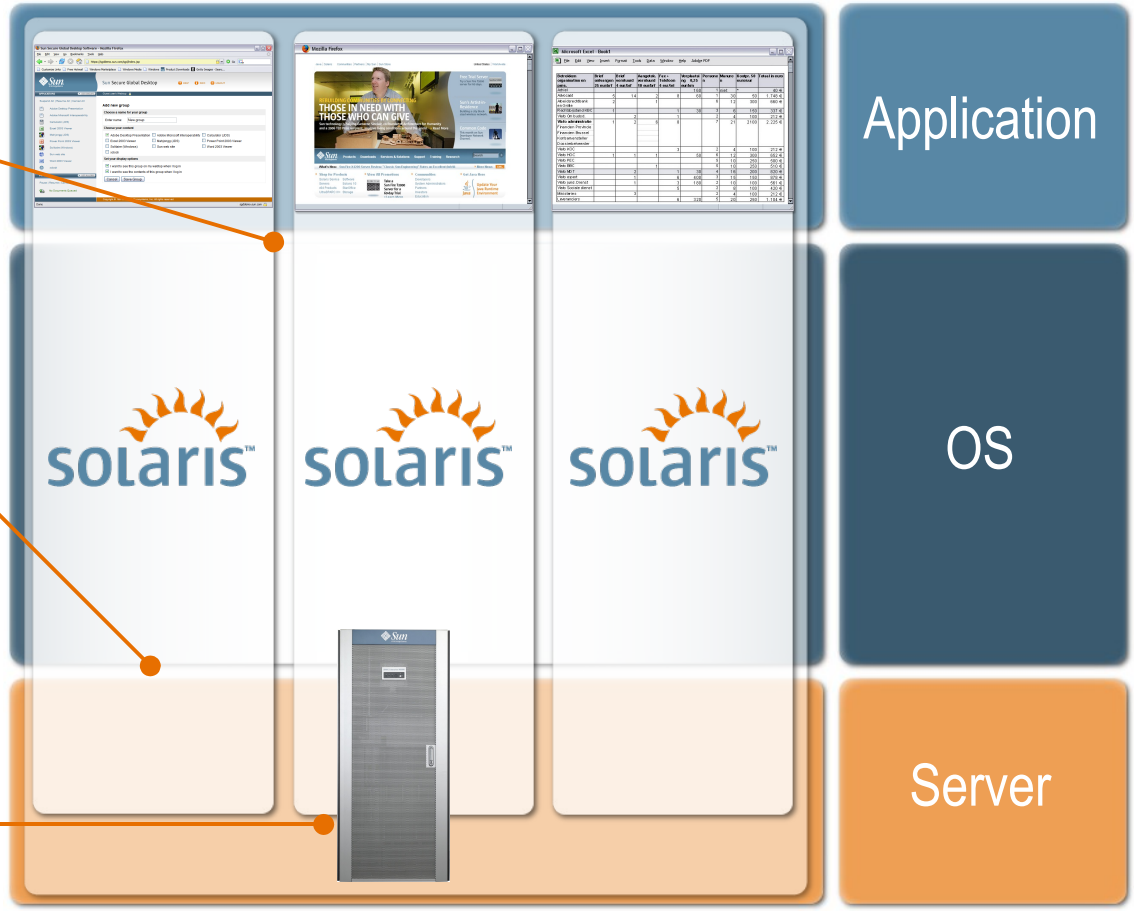
> Very scalable and low overhead
> Single OS to manage
> Fine grained resource management

Hard Partitions

Isolation all the way into the hardware

Only as granular as the hardware allows

Only on certain hardware

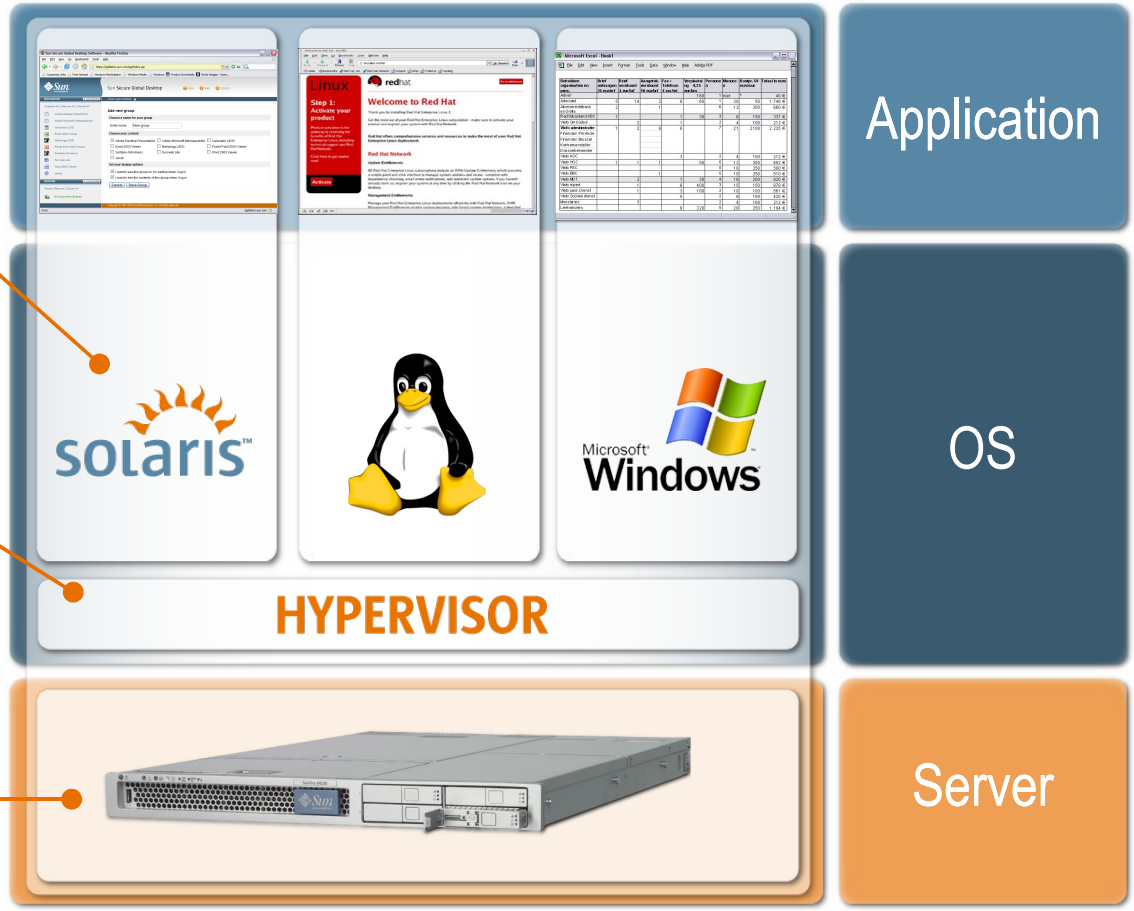


Virtual Machines

Allows different OS versions and types

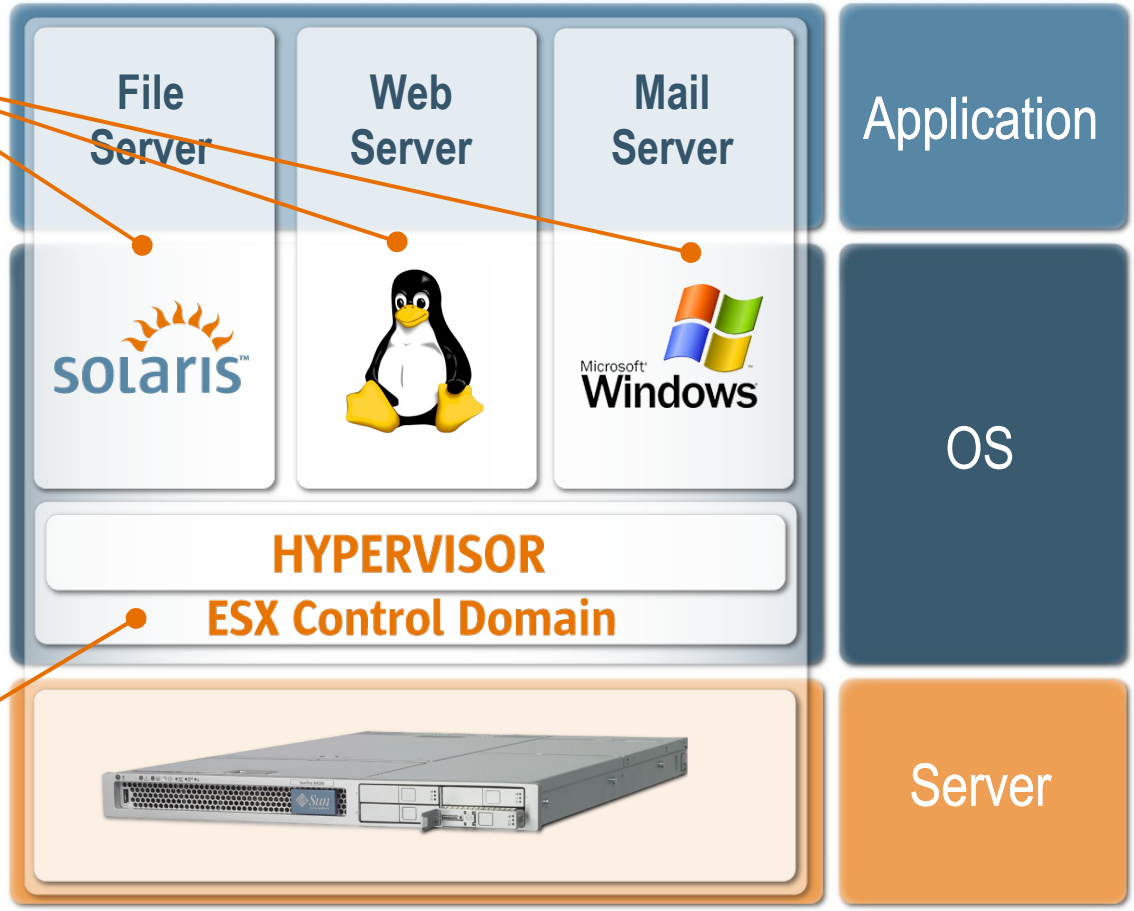
Extra overhead for the Hypervisor

Available on many platforms



VMware ESX

Solaris, Linux and Windows support



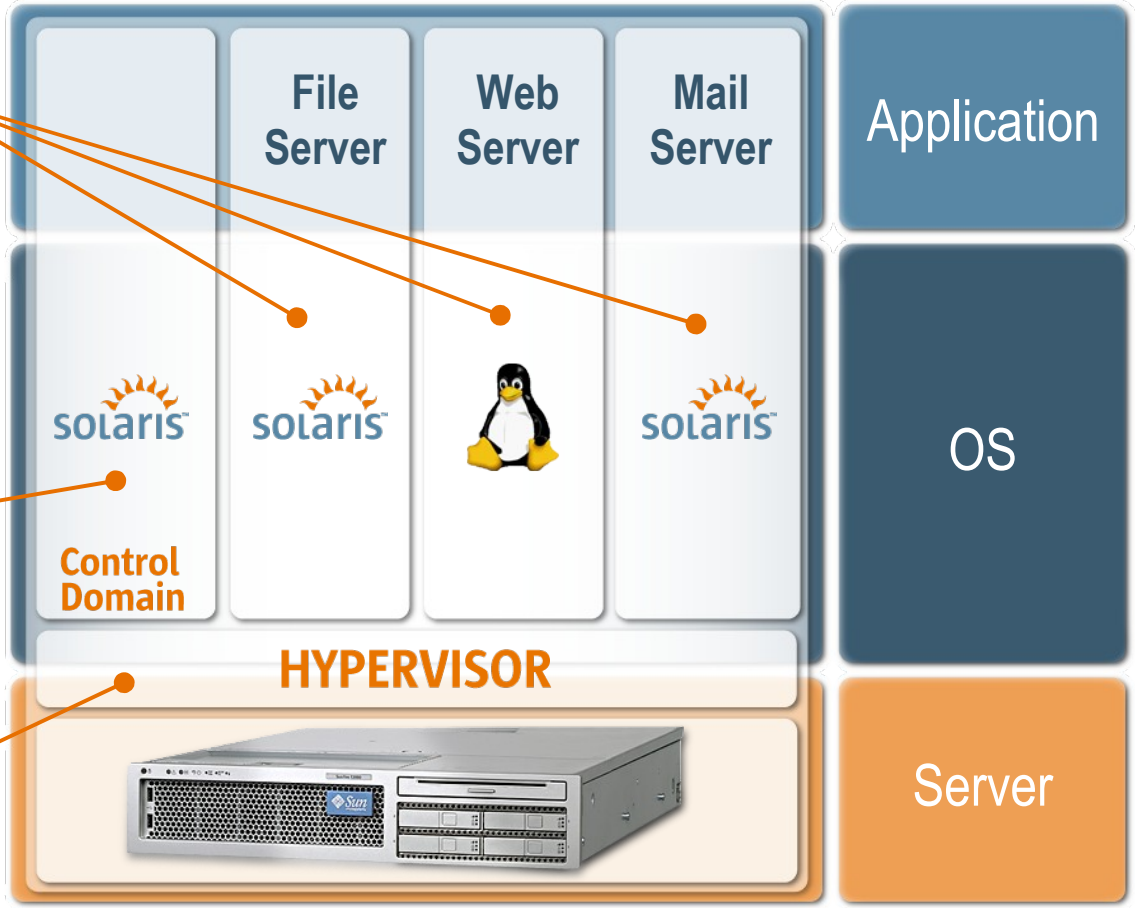
Integrated Control Domain and Hypervisor

Logical Domains

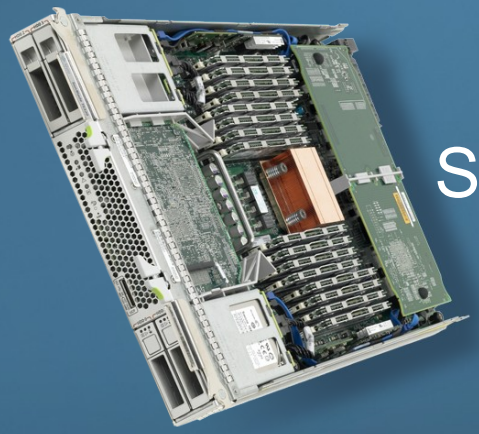
Solaris or Linux guest domains

Solaris Control Domain

Ultra lightweight Hypervisor in the firmware



Starke und sparsame Virtualisierungs-Server



Sun Blade™ T6320

Neu

Sun SPARC® Enterprise T5120

Sun SPARC Enterprise T5220

Stimmt es?

Konventionelles Prozessor Design für multi-threaded Workloads

ULTRASPARC™ CoolThreads™

Taktfrequenz bringt Leistung

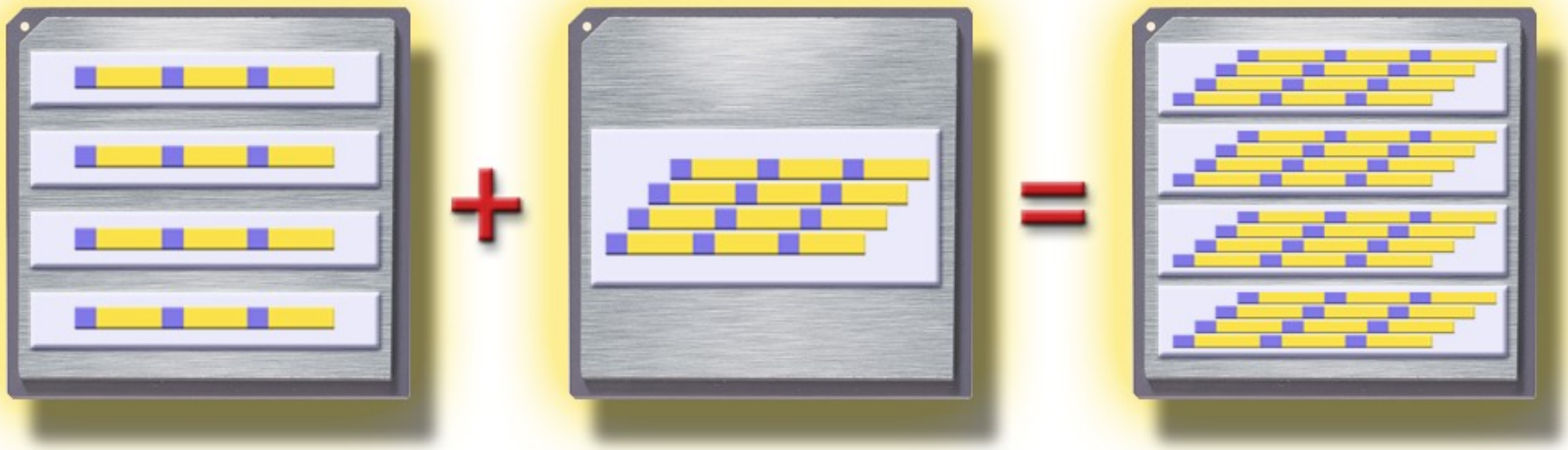
Große Caches

Performance um jeden Preis

Ein Prozessor Design für alle Workloads

Complexe Kerne: Out of Order, Multi-Issue, Speculation

Chip Multi-Threading (CMT)



CMP
chip multiprocessing

n Kerne pro Prozessor

FG-MT
fine-grained multithreading

m Strands pro Kern

CMT
chip multithreading

n x *m* Threads pro Prozessor

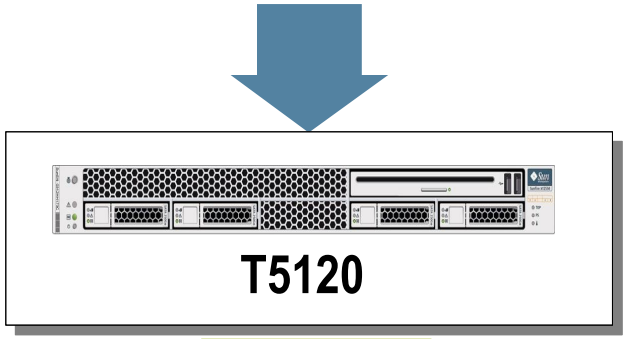
Mit Abstand die sparsamste CPU

	AMD	intel	IBM	
	2nd Gen. Opteron™	Xeon® 5300	POWER6	UltraSPARC T2
Threads per CPU	2	4	4	64
Watts per thread	60	30	33	1.5
Cores per CPU	2	4	2	8
Watts per core	60	30	65	12
10 GbE*	N/A	N/A	N/A	Integrated
Crypto accelerator*	N/A	N/A	N/A	Integrated
PCI-Express*	N/A	N/A	N/A	Integrated
Wattage	119	120	130	94
*Additional watts required	22	22	22	0
Total wattage	141	142	152	94

Der beste Java-Server: SPECjbb2005

In Java geschriebene Server-Applikation für Bestellprozesse

410 Watt



192.055 Ops/s

11x effizienter

1040 Watt

IBM p570 2*4.7GHz Power6 Dual-Core, 4U

175.474 Ops/s

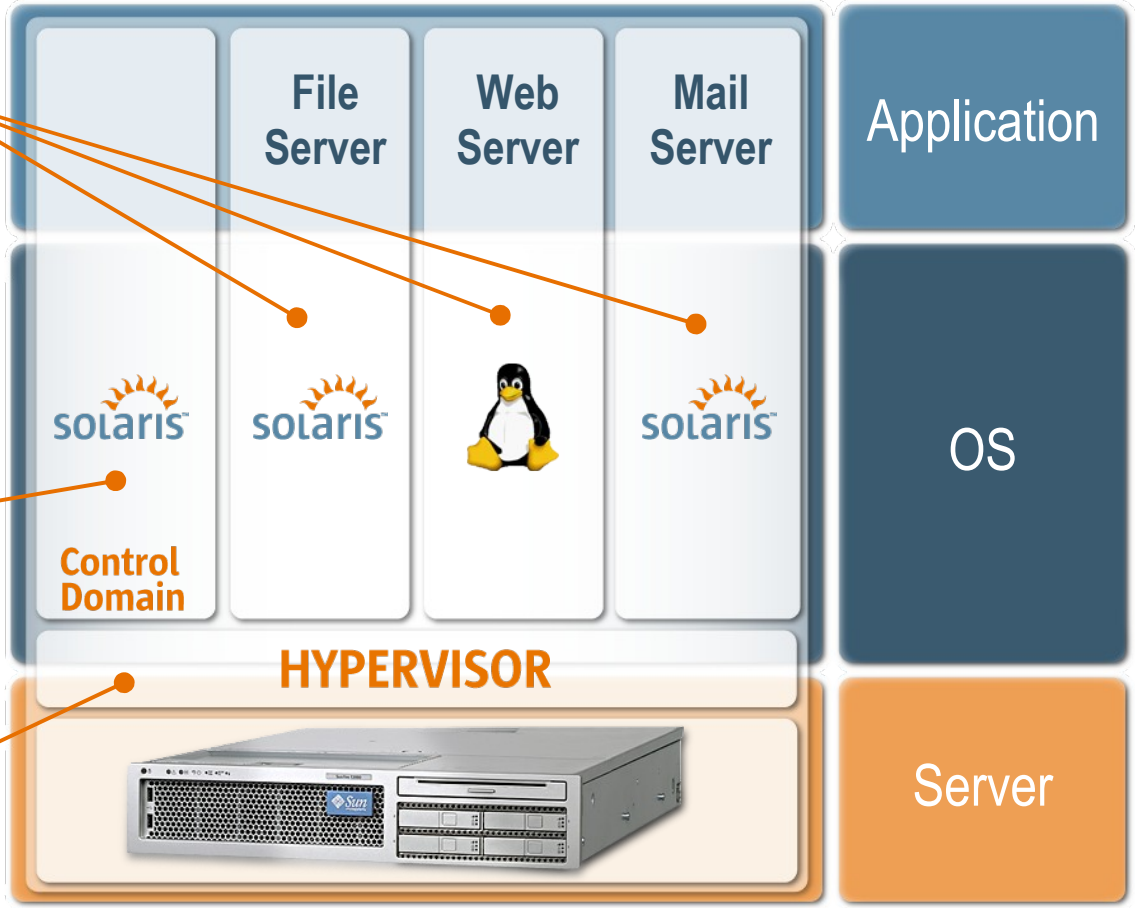
(*) SPECjbb2005 – Details siehe Folie “Das Kleingedruckte”

Logical Domains

Solaris or Linux guest domains

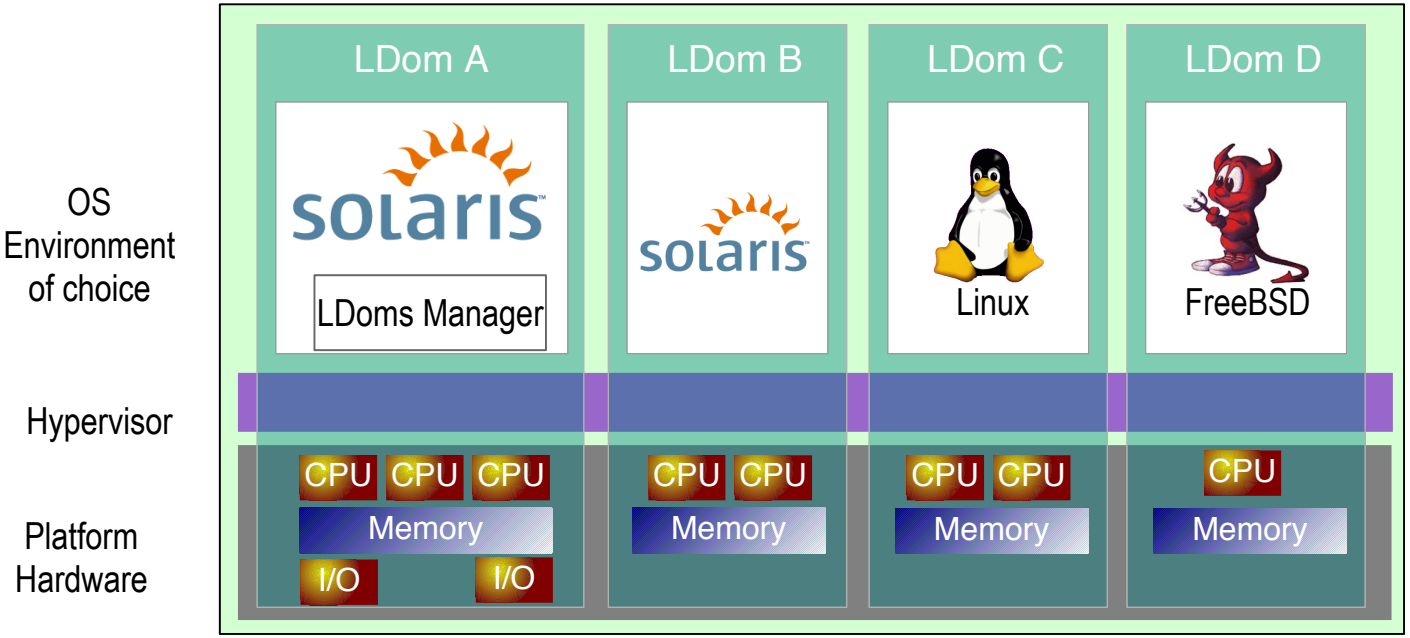
Solaris Control Domain

Ultra lightweight Hypervisor in the firmware

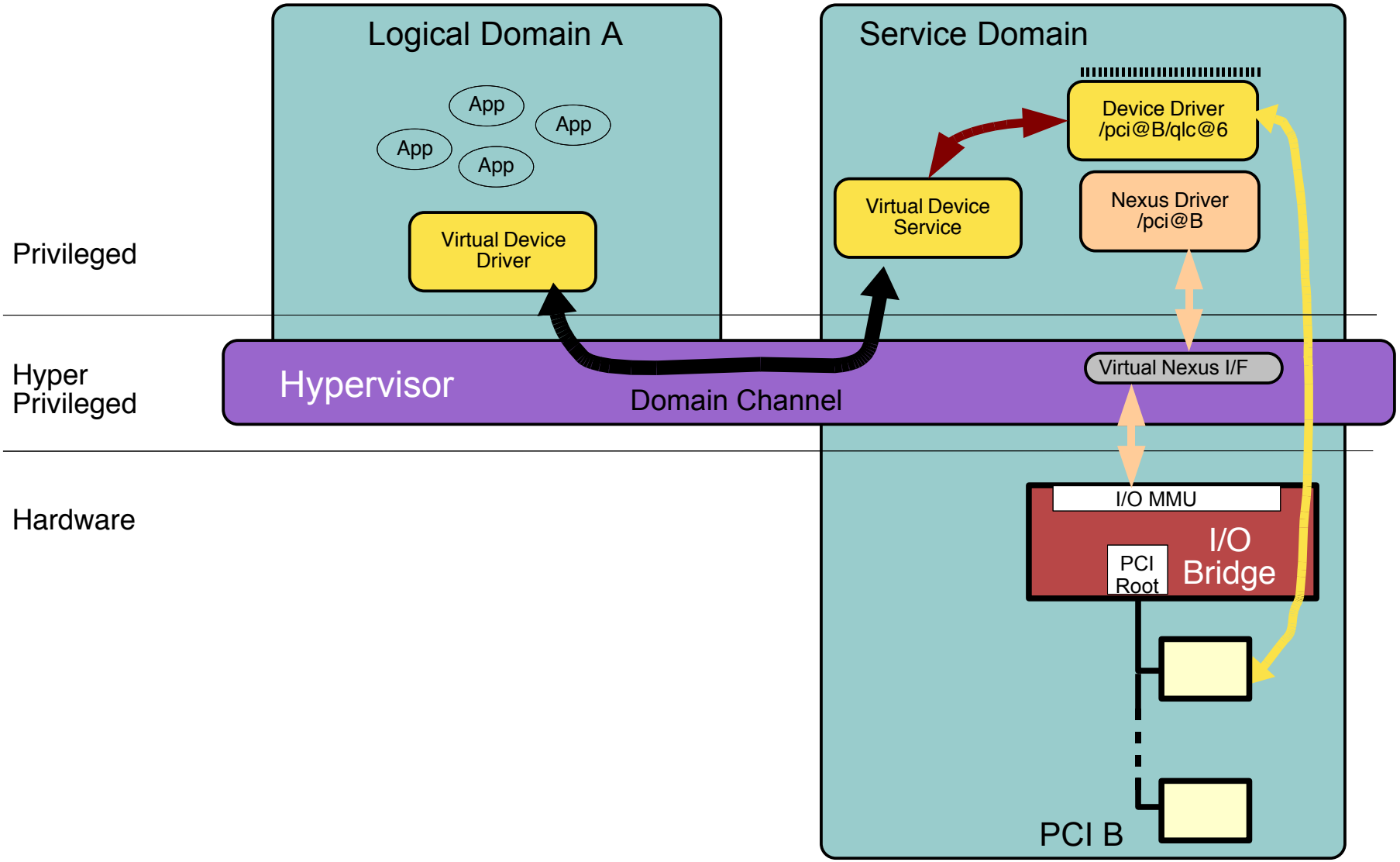


Logical Domains Technologie

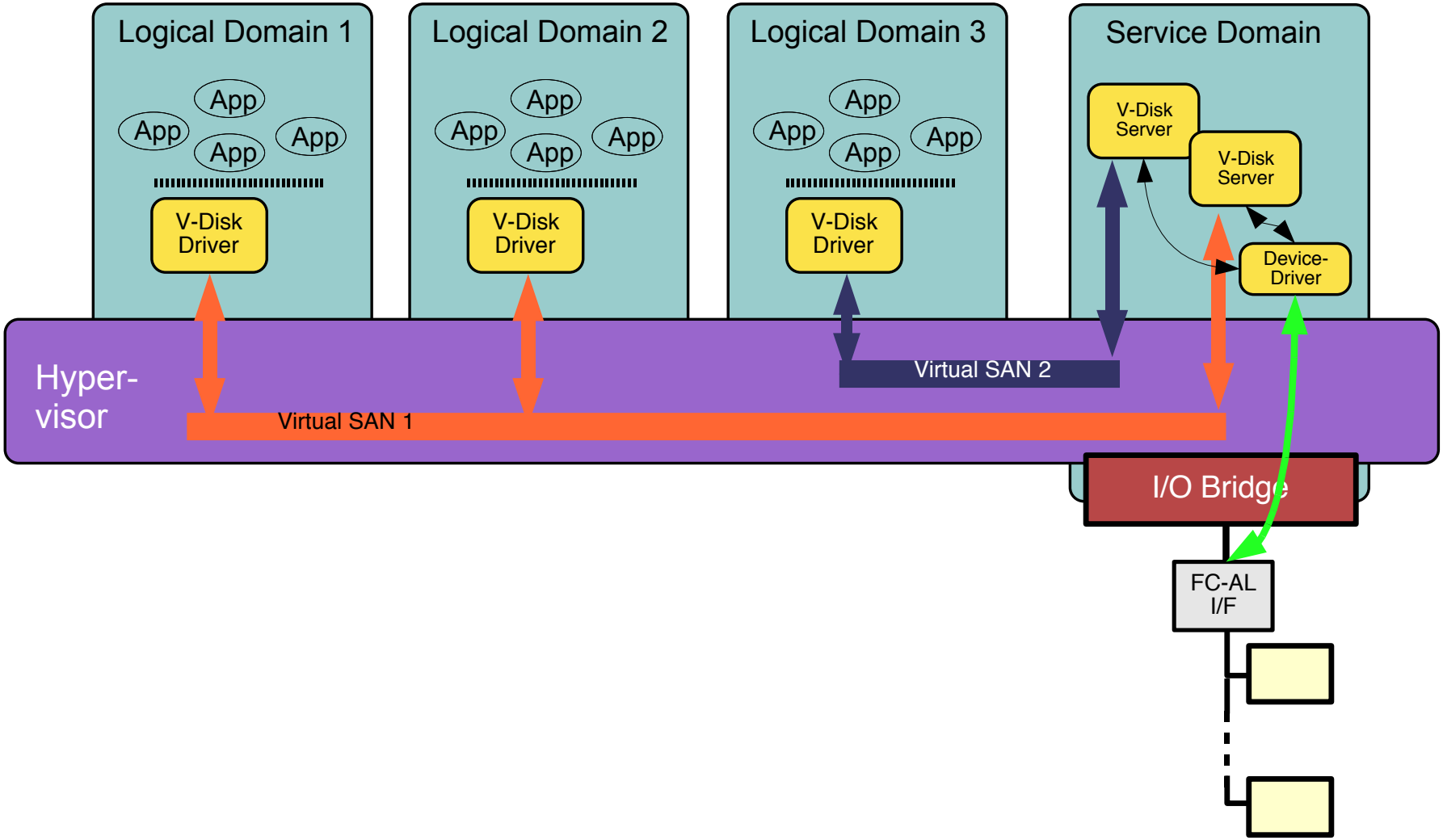
- Partitionierung der Hardware
- LDom = virtuelle Maschine mit eigener OS-Instanz.
- Sicherheit und Isolation wird durch SPARC Hardware und die Hypervisor Firmware erreicht.



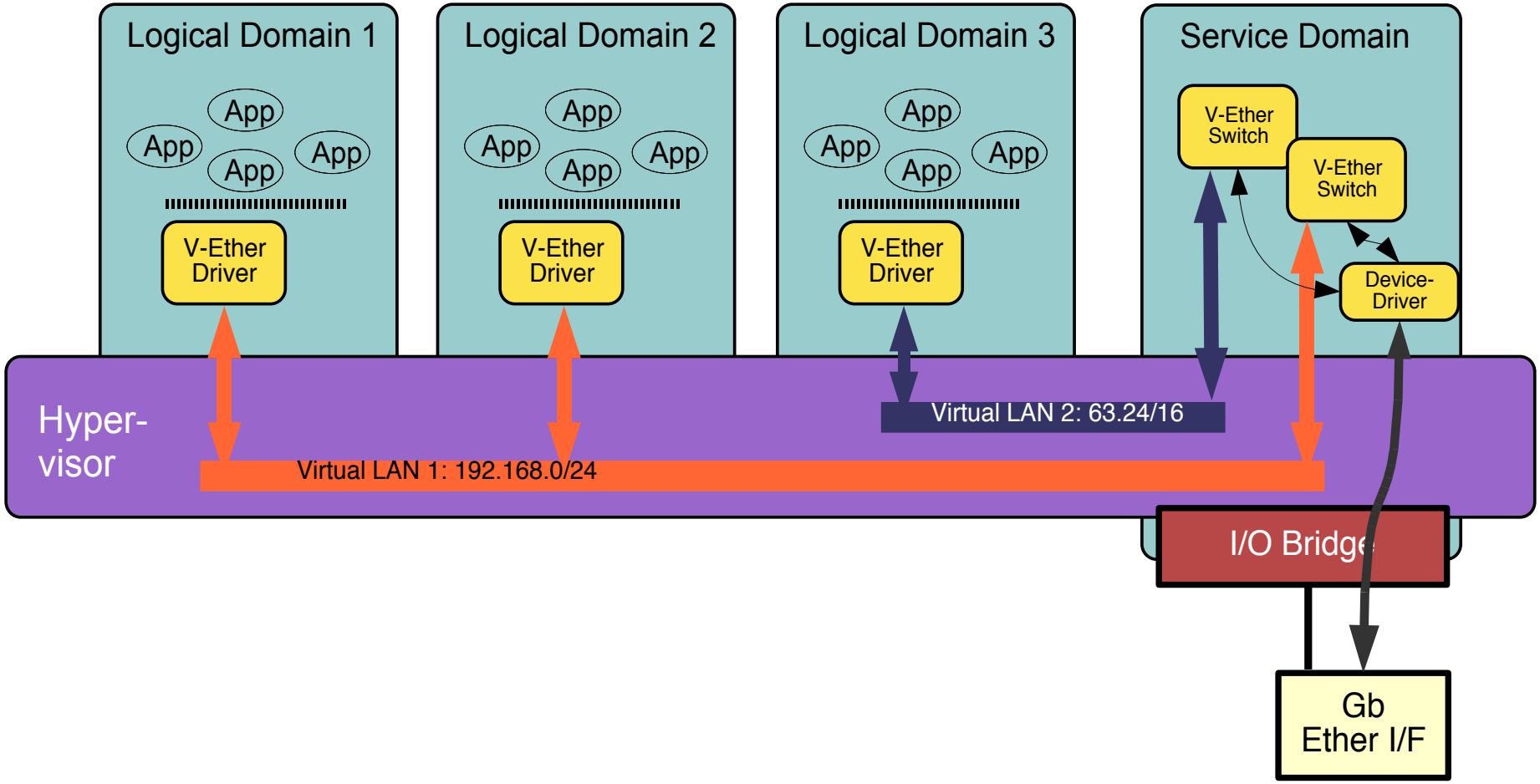
I/O-Architektur



Virtuelle Disks



Virtuelle Netzwerkdevices



LDoms 1.0.1 Unterstützte Plattformen

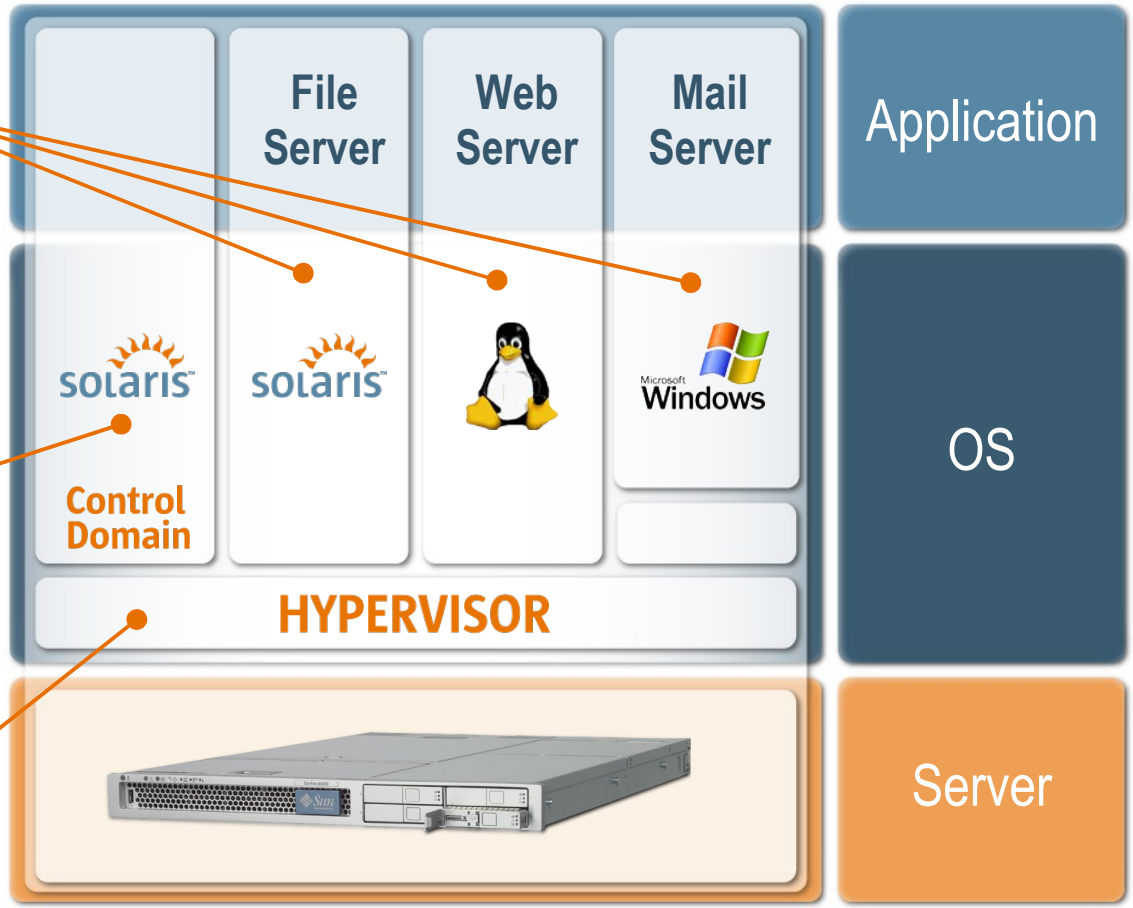
- Unterstützt auf UltraSPARC T1 basierten Systemen
- Sun Fire und SPARC Enterprise T1000
  - Sun Fire und SPARC Enterprise T2000
  - Netra T2000 Server
  - Netra CP3060 Blade
  - Sun Blade T6300 Server Modul
- Unterstützt auf UltraSPARC T2 basierten Systemen
  - Sun SPARC Enterprise T5120
  - Sun SPARC Enterprise T5220
  - Sun Blade T6320 Server Modul

xVM

Solaris, Linux and Windows support

Solaris stability and functionality enhances Xen

Leverage Xen community Hypervisor

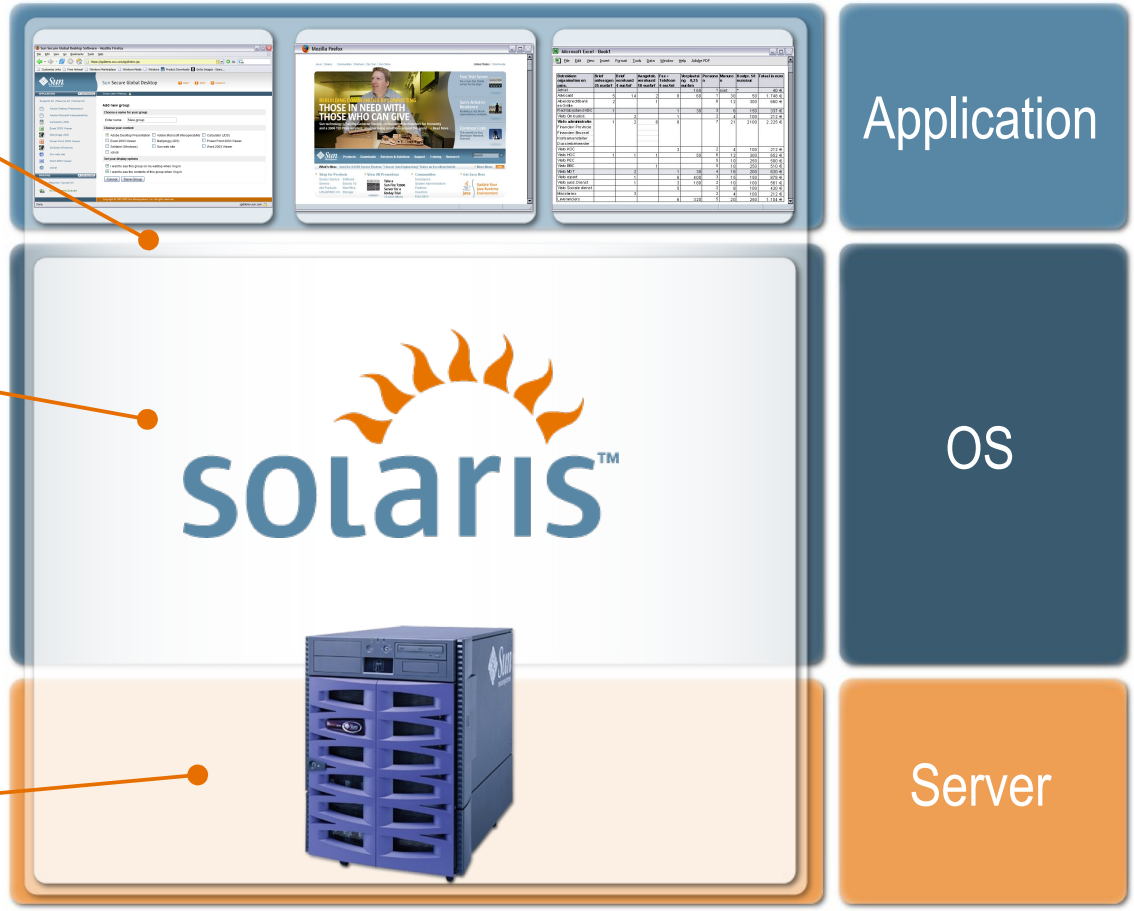


Resource Management

Resource controls only

Very scalable

Available on all platforms

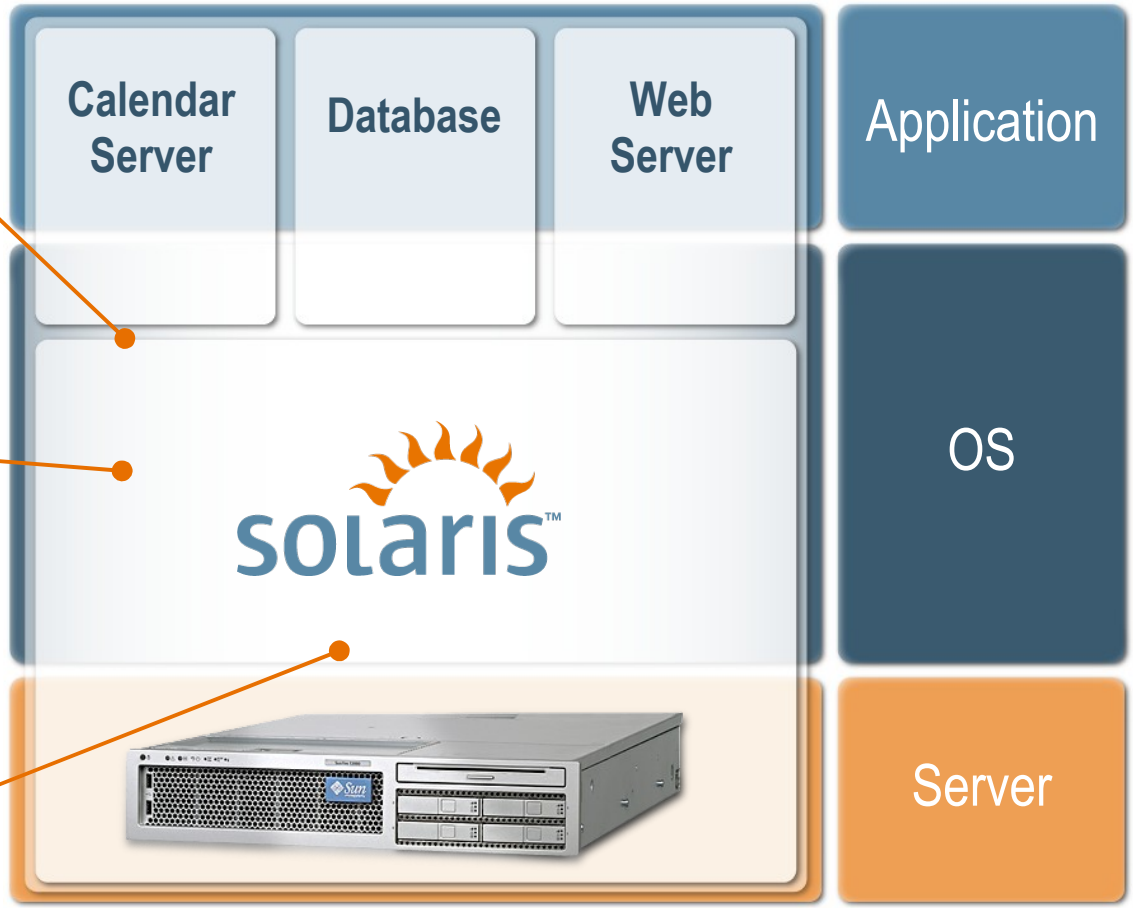


Solaris Containers

Strong isolation between App and System Administrators

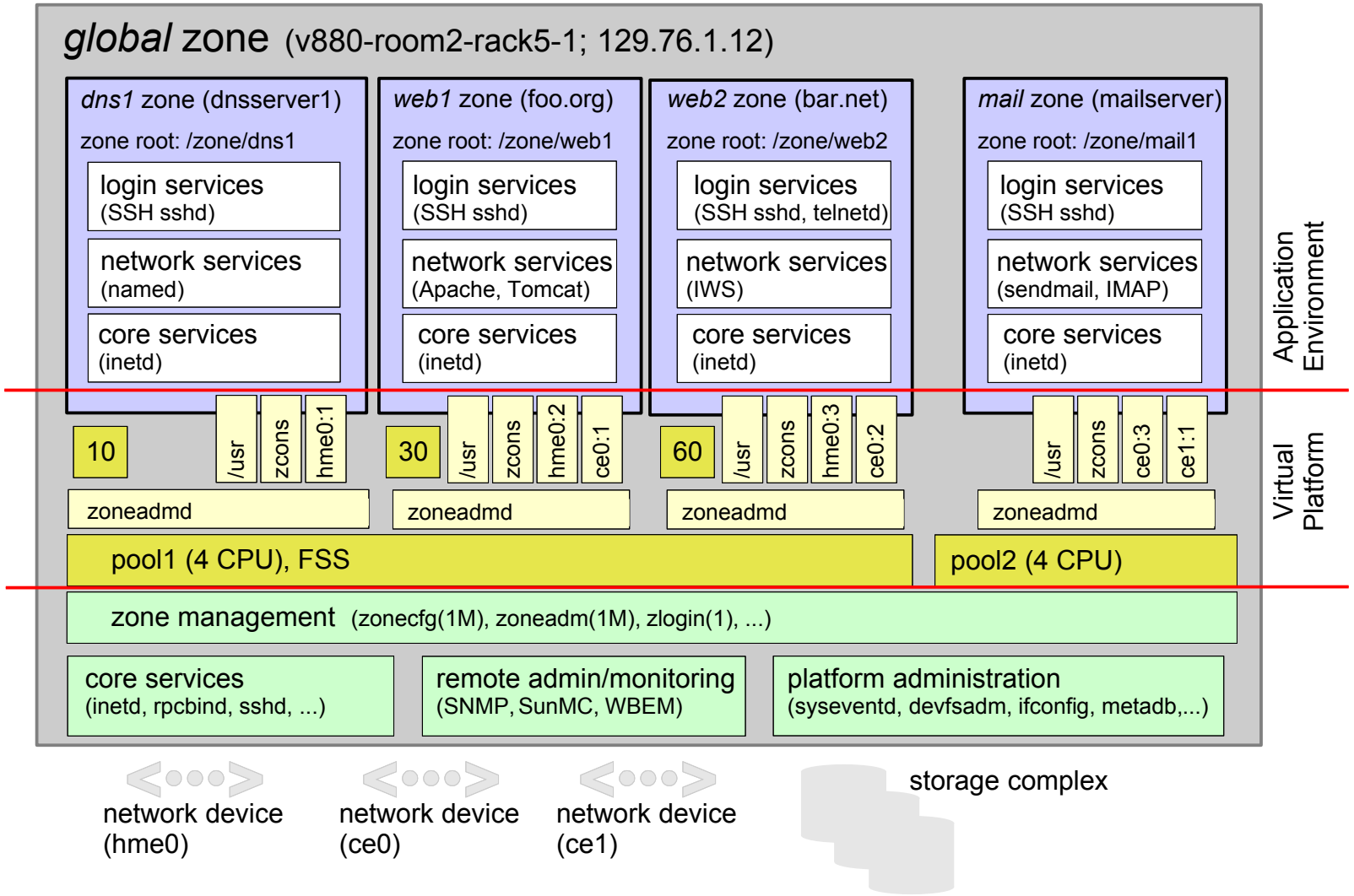
OS Virtualization built into the kernel

Very light weight and scales with any Solaris system



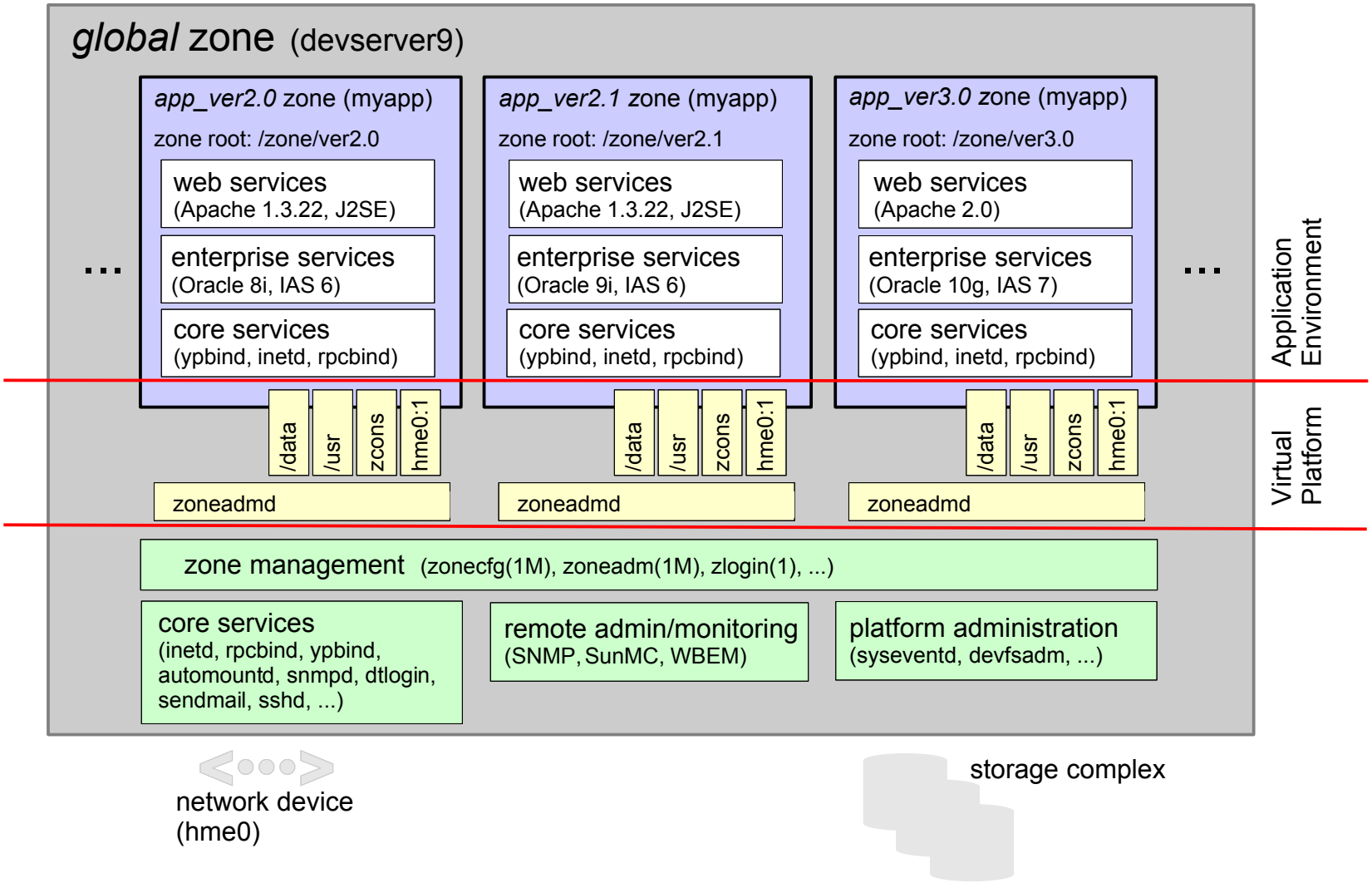
Solaris Containers

Single Application Consolidation



Solaris Containers

Test & Development Systems

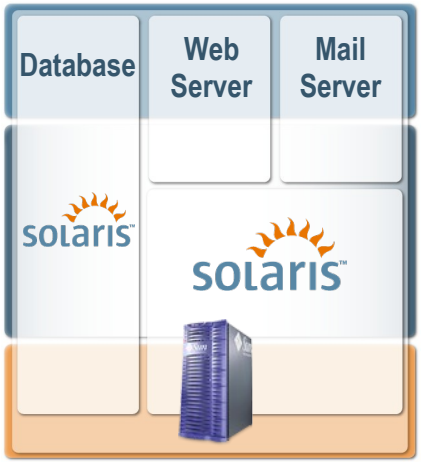


Solaris Containers Successes

- NewEnergy Associates
  - Saved 20% of his 2006 capital budget
- Ning
  - "Solaris is a better Linux than Linux" Marc Andreessen
- EINE dt. Bank:
  - Konsolidierung von 153 Servern auf 35
  - Amortisation in 11 Monaten

Hybrid Solutions

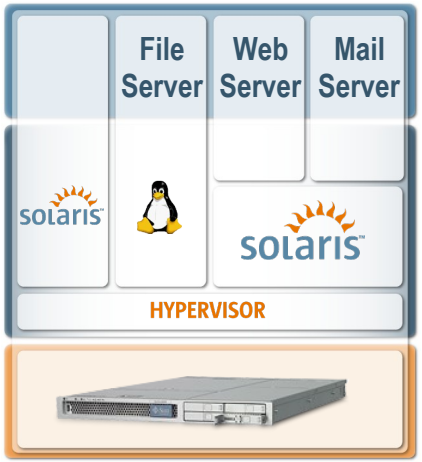
Hard Partitions & OS Virtualization



Dynamic System Domains with Solaris Containers

> Combine high RAS and proven robustness with flexible application environments
> Both can scale all the way up to 144 way systems
> Incur no extra overhead for Virtualization

Virtual Machines & OS Virtualization

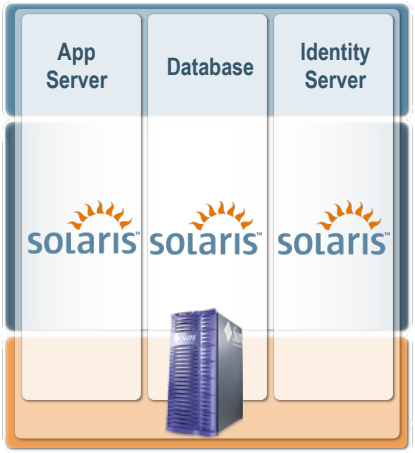


LDoms/Xen/VMware/MSVS with Solaris Containers

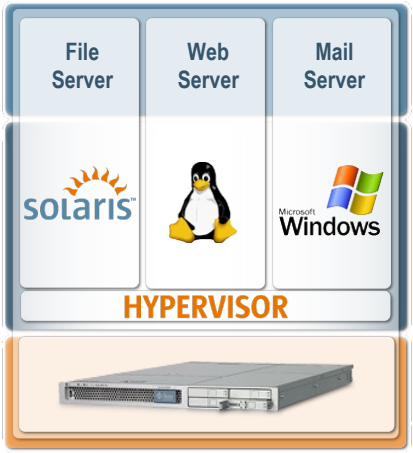
> Combine flexibility of OS version and type with secure application environments

Virtualisierung bei Sun

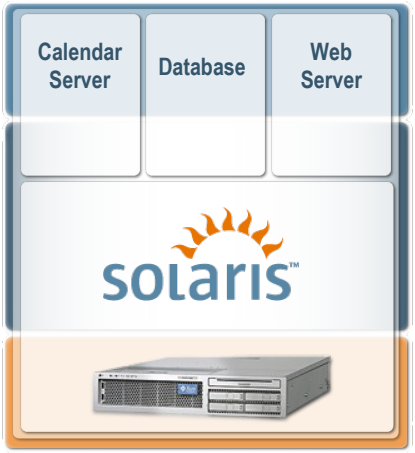
Hard Partitions



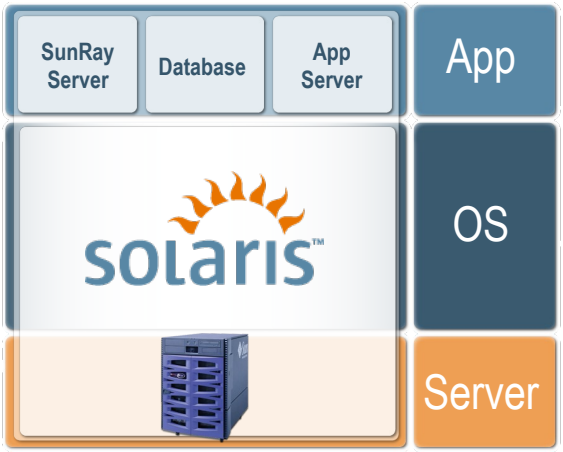
Virtual Machines



OS Virtualization



Resource Management



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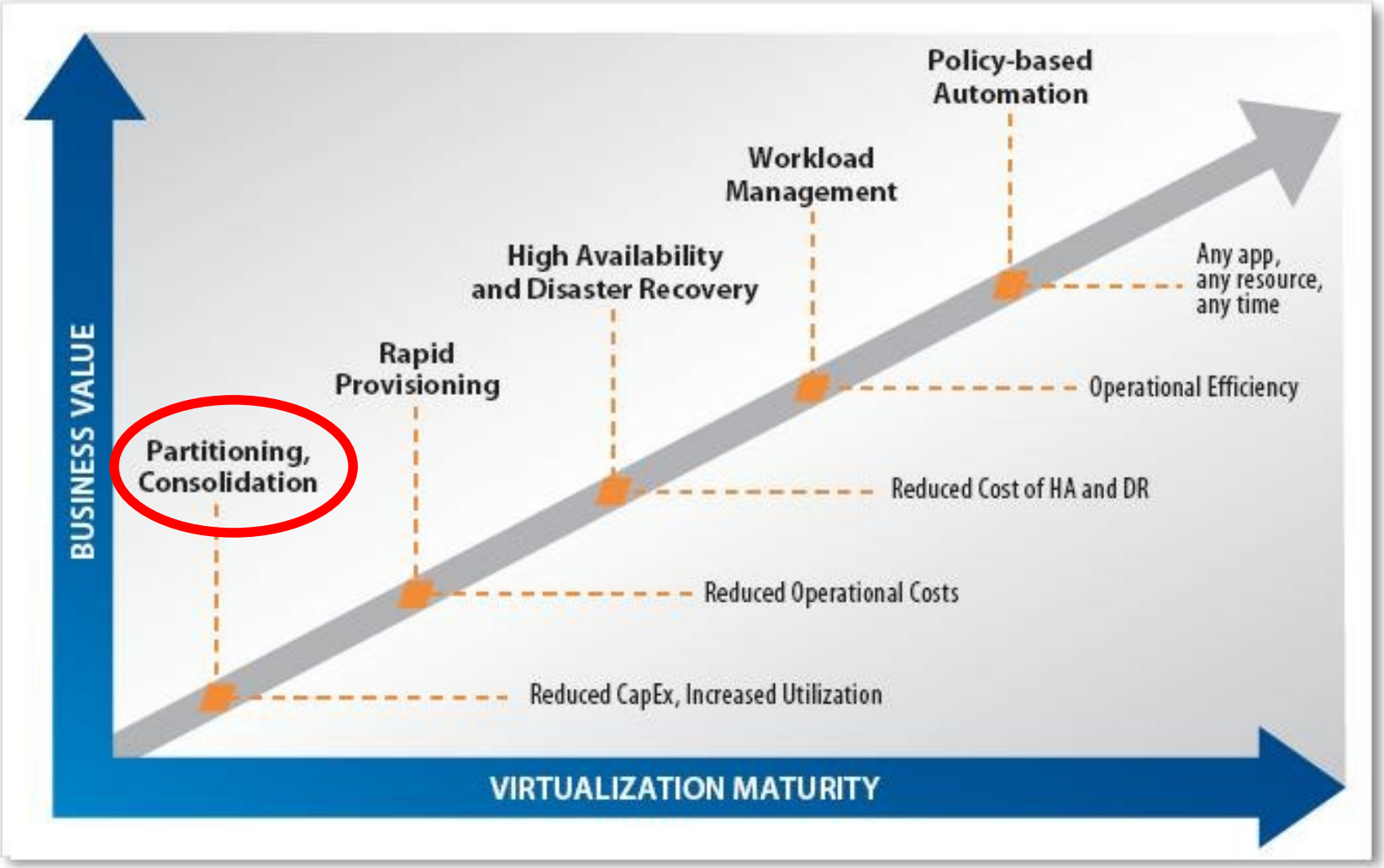
Vorgehensmodell

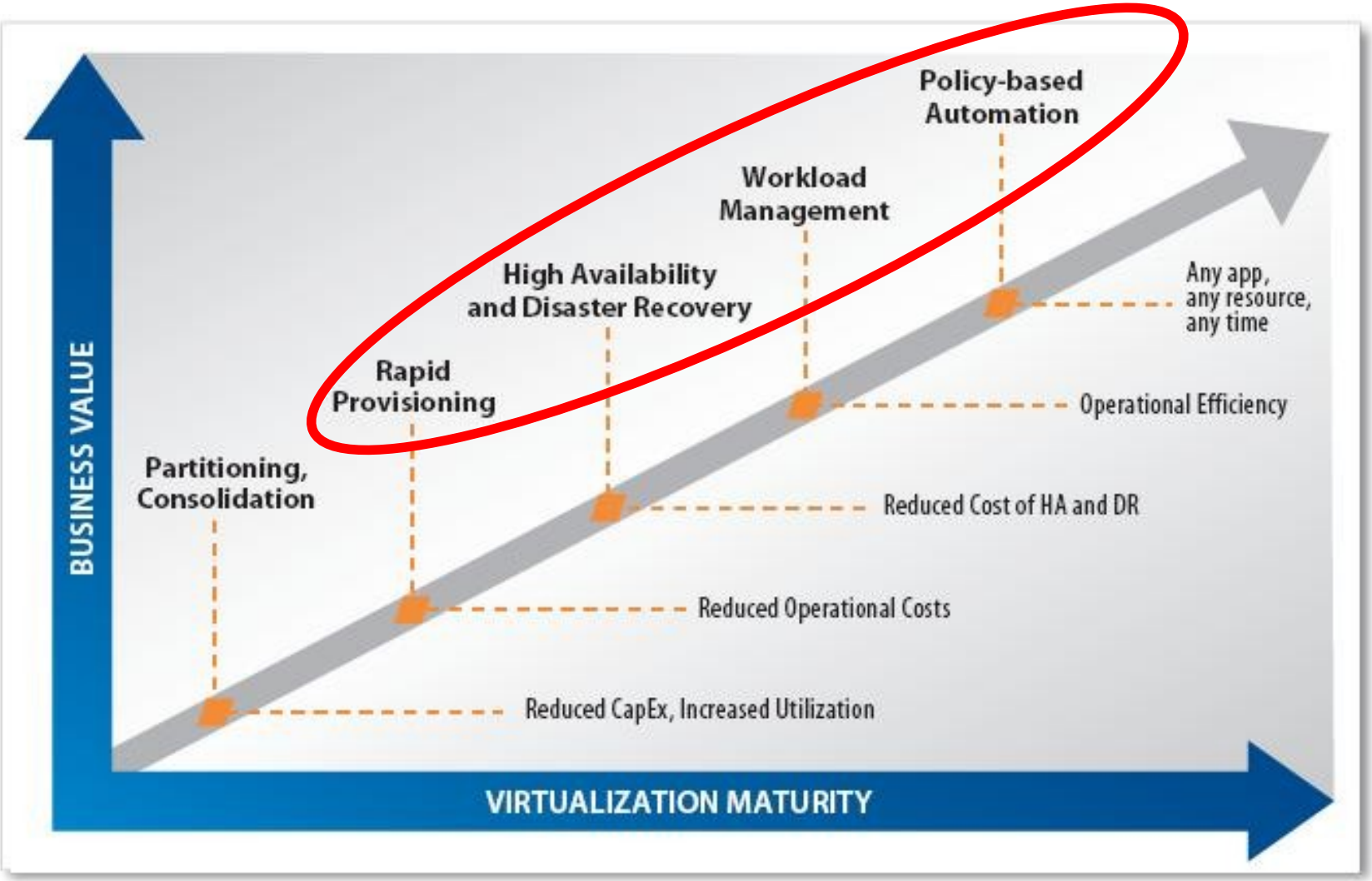
- Welche Ziele sollen erreicht werden?
  - Kostenersparnis
  - Flexibilität, Time-to-Market
  - Sicherheit, Verfügbarkeit
- Welche OS-Plattformen stehen zur Auswahl?
- Welche Virtualisierung erlaubt die Applikation?

1. Schritt: Hardware konsolidieren



Aus: The New Economics of Virtualization, VirtualIron Whitepaper

Soweit zur Pflicht, jetzt kommt die Kür...



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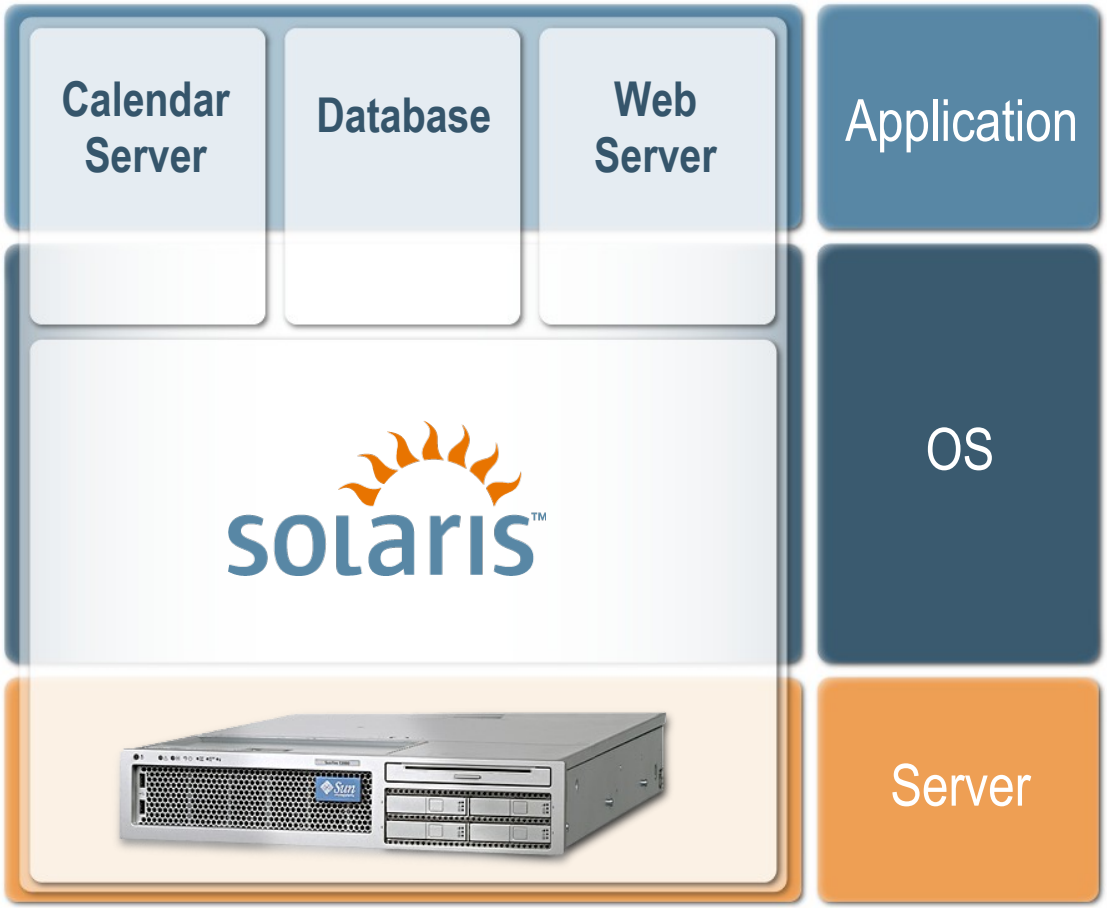
Solaris Container für Virtualisierung

Optimierte Prozesse

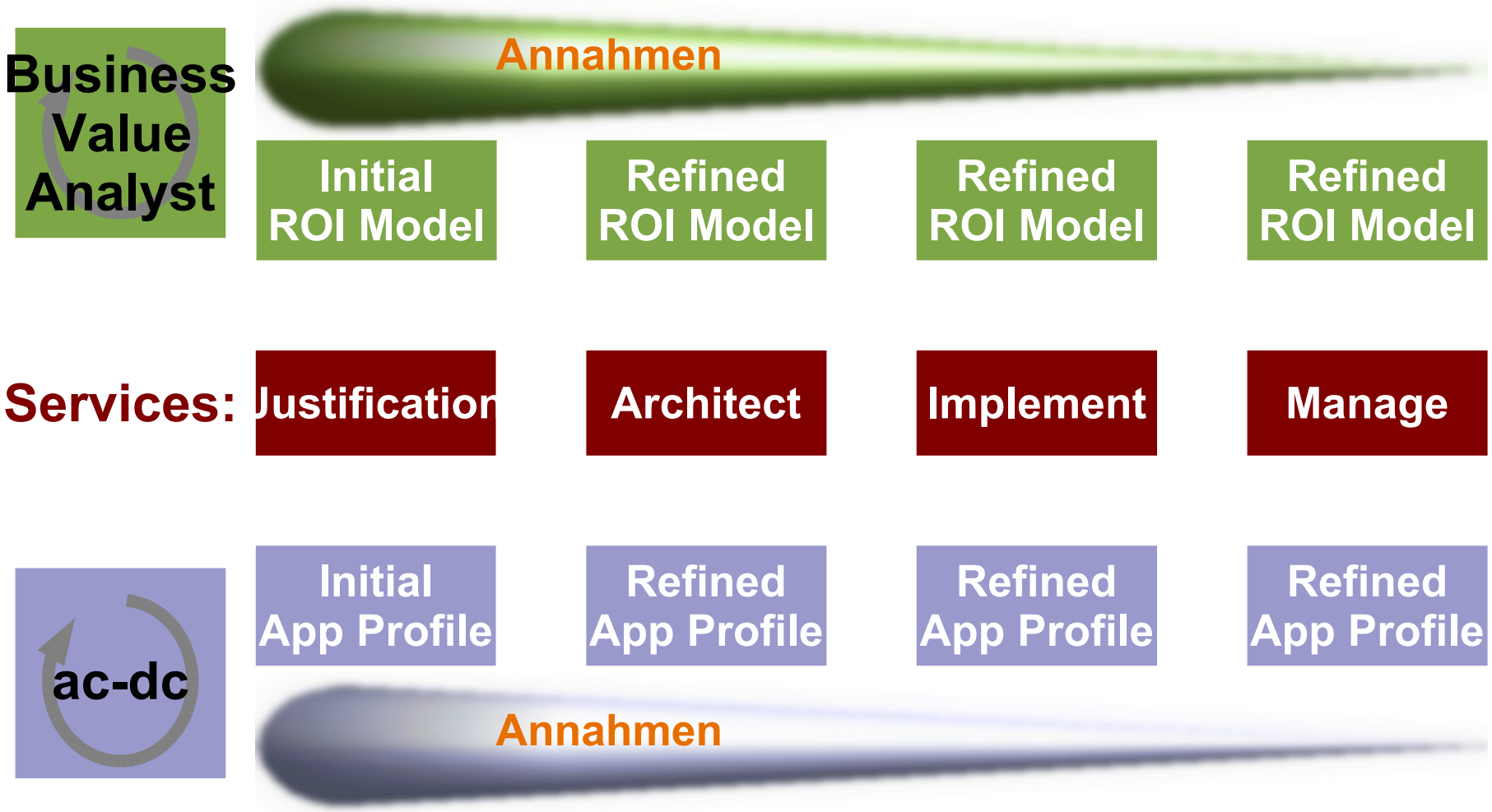
- OS-Monitoring
- FS-Administration
- Patch-Mgmt
- HW-Administration
- Service-Migration
- Weniger Vielfalt
- Deployment



Faktoren für die Auswahl

- Standardapplikationen
- Security-Bereiche (DMZ, Intranet)
- Produktion, Qualitätssicherung, Entwicklung
- Kundenzuordnung
- Standort / DR-Gruppe
- Bekannte Unverträglichkeiten

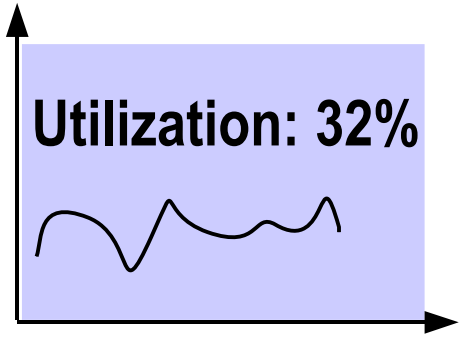
Und was ist die geeignete Lösung ?
2 Methoden zur Qualifizierung

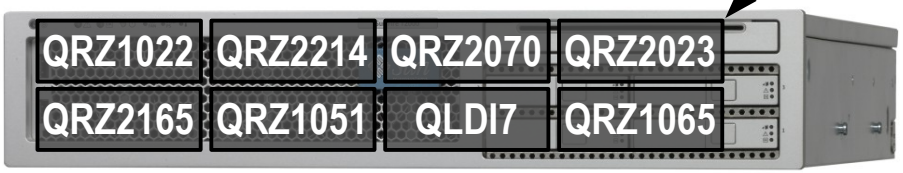


Application Profiling

- Lastverhalten der Applikationen
- Systemanforderungen / Containerfähigkeit
- Lizensierungsmodelle
- Koexistenzmöglichkeiten
- SLA Anforderungen
- Kapazitätsbedarf
- Abhängigkeiten, z.B. im Roll-Out
- Migrationsfähigkeit und -aufwand

Ressource Pools





Res.Pool: P2C_

SunCluster

Res.Pool: P1ZL

Res.Pool: P1ZR

Zusammenfassung

- Verschiedene Methoden zur Virtualisierung haben unterschiedliche Eigenschaften
- Es geht um mehr als nur Serverauslastung
- Logical Domains sind SPARC HW-Virtualisierung
- UltraSPARC T2 ist die stärkste CPU der Welt

mario.beck@sun.com