



## **ORACLE** Database Appliance X5-2



# Oracle Database Appliance

Einfach

Zuverlässig

Bezahlbar



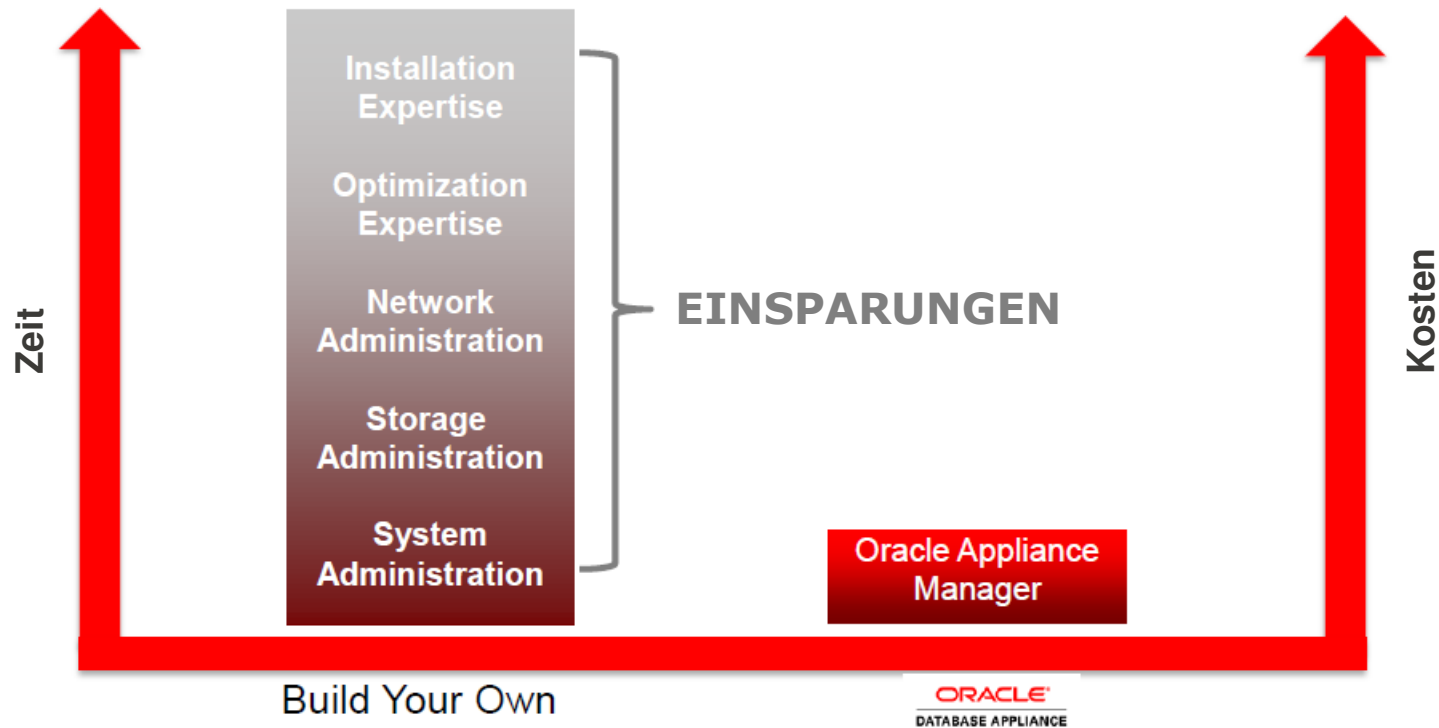
## Technische Übersicht Oracle Database Appliance X5-2

EINFACH

# Oracle Database Appliance

# Oracle Database Appliance

Einfach zu installieren, zu managen und zu unterhalten



**Build vs. Buy:  
Compare the Oracle Database  
Appliance (4:24)**

**VIDEO:** <http://www.youtube.com/watch?v=os4RDVclWS8>

# Oracle Database Appliance

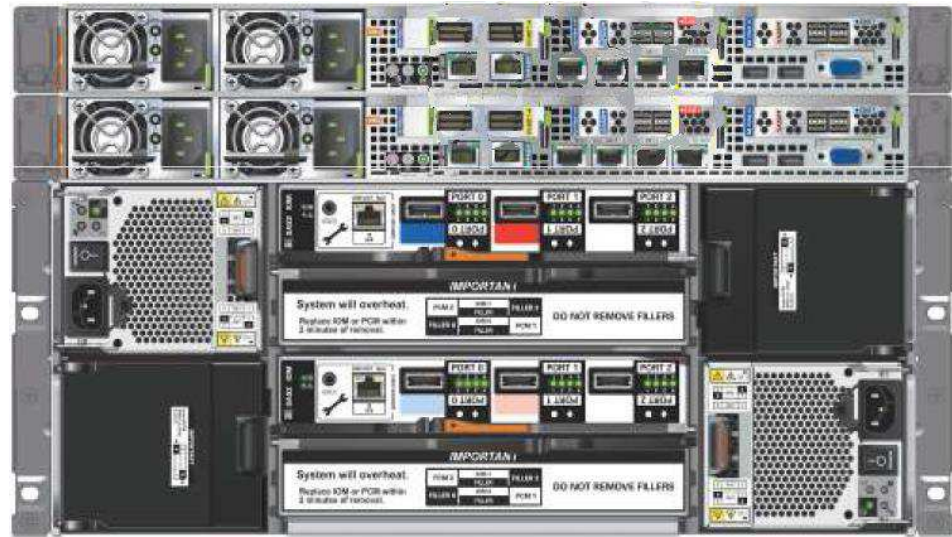
# Oracle Database Appliance

## Schneller Einsatz eines Datenbank Clusters Einfache Installation

Spannung einstecken

Netzwerk anschließen

Wizard-gestützter Install



ZUVERLÄSSIG

# Oracle Database Appliance

# Oracle Database Appliance

## Vollständig redundante Hardware

- Zwei Dual-Sockel Oracle Linux Server mit je:
  - USB: 6 x 2.0 USB ports; 2 vorne, 2 hinten, 2 intern
  - 1 x dual-port InfiniBand HCA (40 Gb/s)
  - 4 x onboard auto-sensing 100/1000/10G Base-T Ethernet (copper)
  - 4 x PCIe 3.0 slots
  - Optional wählbare „double-“ oder „triple-mirroring“ Storage-Redundanz
  - Redundante „hot-swappable“ Schalt-Netzteile, Kühlung und Lüfter
  - *Optional* 10GbE SFP+ für externe Netzwerk Connectivity (bedingt Ersatz von Infiniband HCA).



# Oracle Database Appliance

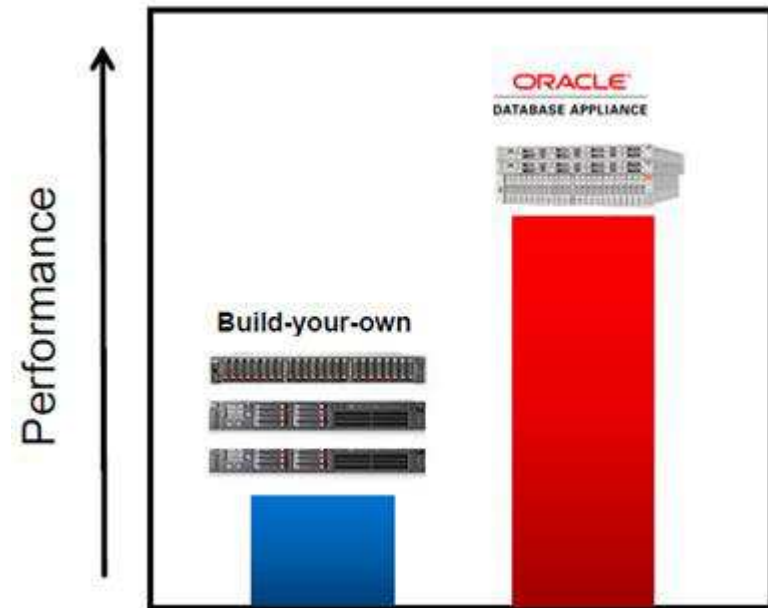
## Zuverlässige Software

- Oracle Database 11g Release 2 und Oracle Database 12c Enterprise Edition
  - Real Application Clusters (RAC)
  - RAC One Node
  - Single Instance
- Oracle Grid Infrastructure
  - Automatic Storage Management (ASM)
  - Oracle Clusterware
- Oracle Linux Release 5.11 (vorinstalliert)
- Oracle Appliance Manager (vorinstalliert)
- Oracle VM (optional).

# Oracle Database Appliance

## Best-In-Class Performance

- Optimales Daten-Layout
  - Ideale Diskgroup Konfiguration
  - Data-Striping mit ASM
- Direct-Attached Storage
  - Eliminiert SAN/NAS Bottlenecks
- Out-of-the-Box Tuning
  - erhöht Durchsatz
  - verbessert Antwortzeiten



BEZAHLBAR

# Oracle Database Appliance

# Oracle Database Appliance

## Was stellt man mit 2000 Extra Stunden an?



The diagram illustrates the lifecycle of the Oracle Database Appliance. It consists of five red rounded rectangular boxes connected by a circular path. The boxes are labeled: Installation (top), Deployment (right), Maintenance (bottom right), Support (bottom left), and Scaling (left). The path starts at Installation, goes to Deployment, then to Maintenance, then to Support, then to Scaling, and finally back to Installation.

**ORCInternational**

**The Oracle Database Appliance simplifies time-consuming DBA tasks and saves:**

- 835 hours in first year**
- 669 hours each subsequent year**

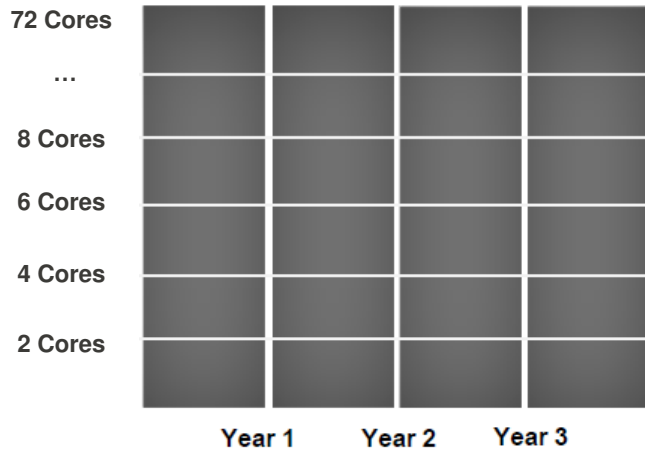
<http://www.oracle.com/us/products/database/database-appliance-vs-sql-server-1434947.pdf>

ORACLE

# Oracle Database Appliance

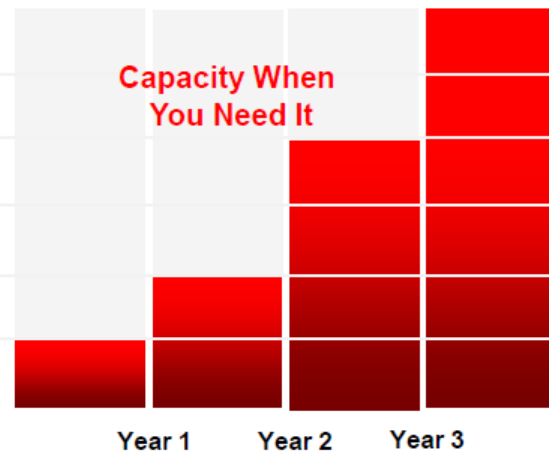
## Capacity On Demand

Option 1: Build Your Own  
*Lizenzierung und KAUF im VORAUS  
von 72 Cores*



**Pay It All Now**

Option 2: Buy Database Appliance  
*Lizenziere nach WACHSTUM und SPARE EIN.*



**Pay As You Grow**

**OR**

# ODA GENERATIONEN

## Oracle Database Appliance

# Oracle Database Appliance

## ODA Generationen



	ODA V1 – Oct 2011	ODA X3-2 – Mar 2013	ODA X4-2 – Dec 2013	ODA X5-2 – Feb 2015
Processor	Intel X5675	Intel E5-2690	Intel E5-2697 V2	Intel Xeon E5-2699 V3 processors
Node	Built-in (X4370 M2)	X3-2	X4-2	X5-2
Sockets/node	2	2	2	2
Cores / node (total)	12(24)	<b>16(32)</b>	<b>24(48)</b>	<b>36(72)</b>
Max Memory / node (total)	96GB (192GB)	<b>256GB (512GB)</b>	256GB (512GB)	256GB, <b>upgradeable to 768</b>
Boot disks (Free space)	500GB (250GB)	<b>600GB (350GB)</b>	600GB (350GB)	600GB (350GB)
Networking	6 x 1GbE NICs 2 x 10GbE fiber NICs	<b>4 x 10GbE Copper NICs</b>	4 x 10GbE Copper NICs <b>(opt public fiber interface)</b>	4 x 10GbE Copper NICs (opt public fiber interface)
Form Factor/RU	Single 4U chassis	<b>2 x 1RU servers &amp; 1 x 2RU disk shelf</b>	2 x 1RU servers & 1 x 2RU disk shelf	2 x 1RU servers & <b>1 x 4RU disk shelf</b>
Shared Storage	292GB SSDs 12TB SAS raw	<b>800GB SSDs 18TB SAS raw</b>	800GB SSDs 18TB SAS raw	800GB SSD – REDO <b>1.6TB SSD – ODA Cache 64TB SAS raw</b>
Storage Expansion	N/A	<b>Additional Storage Shelf</b>	Additional Storage Shelf	Additional Storage Shelf

# HARDWARE

## Oracle Database Appliance



# Oracle Database Appliance

## Oracle Database Appliance X5-2

### Spezifikationen der Basis-Konfiguration

- 5<sup>th</sup> Generation 2-Socket Database Servers
  - Fastest Xeon chips, 18-core, 256 GB to 768 GB DRAM
- Ultra-Fast InfiniBand Interconnect
  - 40 GbE private network
- High Capacity Storage Shelf
  - 800 GB ODA Fast log storage
  - 1.6 TB of ODA Fast cache storage
  - 64 TB Disk storage



# Oracle Database Appliance

## ODA X5-2 Database Servers

### Faster Processors, More Cores, More Memory



- 18-core Xeon Haswell-EP - fastest Intel processor ever shipped
  - 50% faster than existing Ivy Bridge (X4-2) processor
- Faster and larger memory - DDR4 upgradeable from 256 GB (8x32GB) to 768 GB
- Hardware RAID controller for local disk
  - Increased resiliency and performance with 1 GB controller cache
  - Fast reimage times
- 2 Redundant 1/10 GbE network
- Optional 10 GbE SFP+ public networking

### X5-2 vs X4-2

**50% More Database Cores**

**72 cores - 18-Core Xeon® E5-2699 v3**

**50% More DIMM Slots**

**Up to 1.5 TB of DRAM, 512 GB Default**

# Oracle Database Appliance

## Introducing ODA X5-2 Storage shelf

### Highly optimal I/O Performance

- Hierarchical storage architecture
- 4 x 200 GB SDD
  - Write intensive redo logs
- 4 x 400 GB SSD
  - Cache and data storage
- 16 x 4 TB High Capacity disk
  - Data and backup storage



### X5-2 vs X4-2

3.5x more disk storage

21/32 TB usable

New 1.6 TB flash storage

For cache and data storage

# Oracle Database Appliance

## Storage Shelf Erweiterung

### Spezifikationen der Storage-Erweiterung

#### Double Available Storage Capacity

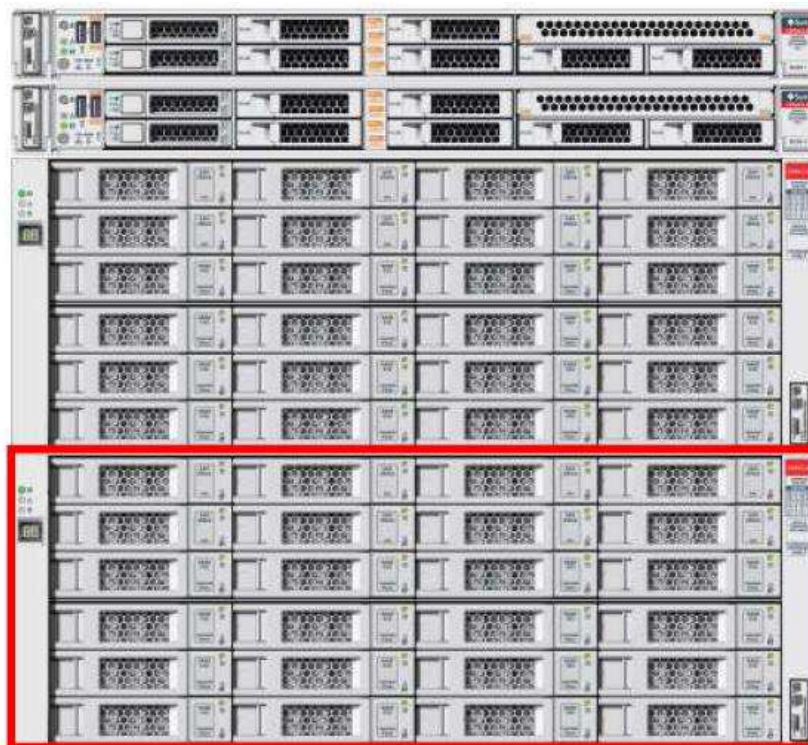
- Additional 64 TB HDD, 128 TB total for DATA
- Additional 800GB SSD, 1.6 TB total for REDO
- Additional 1.6 TB SSD, 3.2 TB total for Cache

#### Zero Administration

- Automatically integrates when plugged in
- Data automatically distributes to new shelf

#### Online Expand Storage

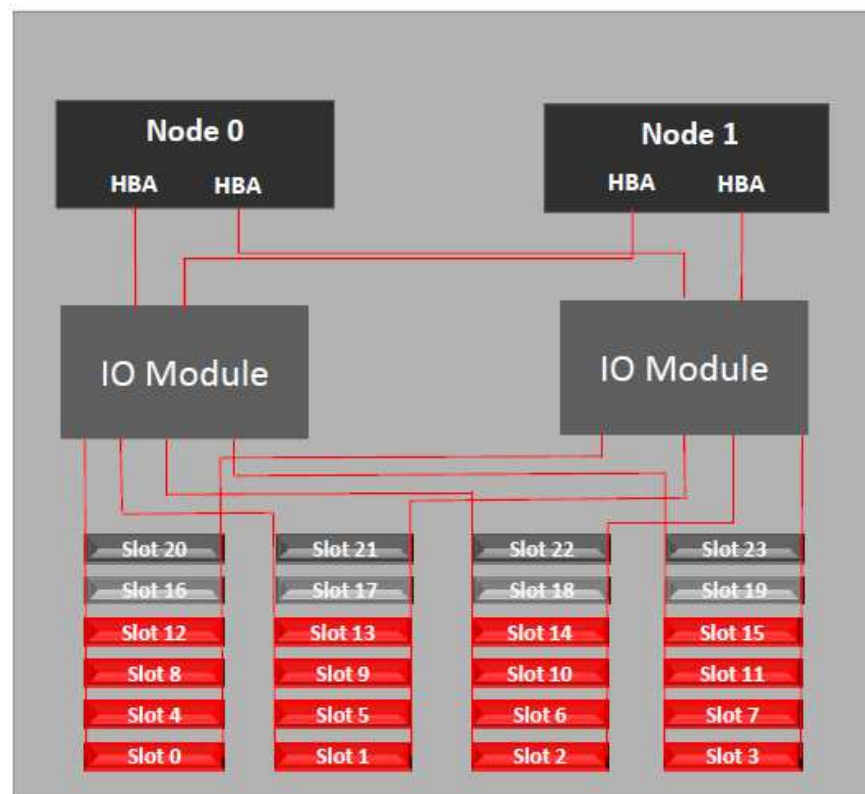
- Hot-plug storage expansion shelf
- No database downtime



# Oracle Database Appliance

## Storage – Built-In Redundanz

- Each Server Node
  - 2x HBA
  - In case of HBA failure
    - Multipath software transparently manages both paths for the database
- Storage Shelf
  - 2x IO Modules (Controllers)
    - Each connects to all 24 disks to protect against failure
  - Redundant HDDs and SSDs
    - ASM stripes data across disks to protect against failure

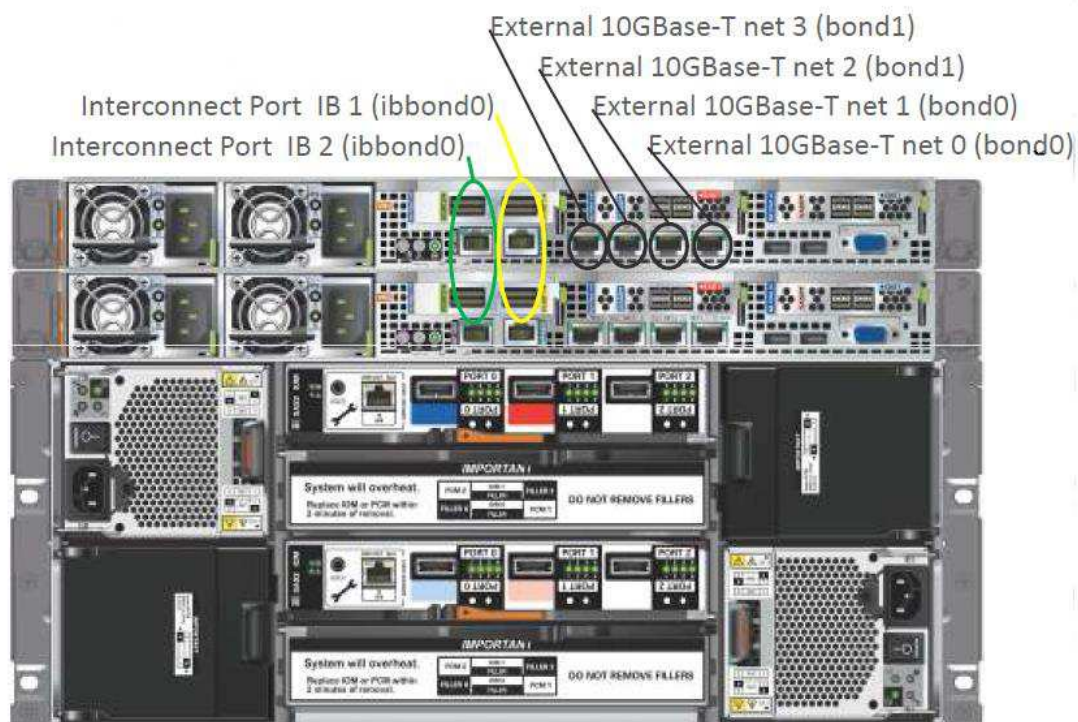




# Oracle Database Appliance

## Standard Verkabelung der X5-2

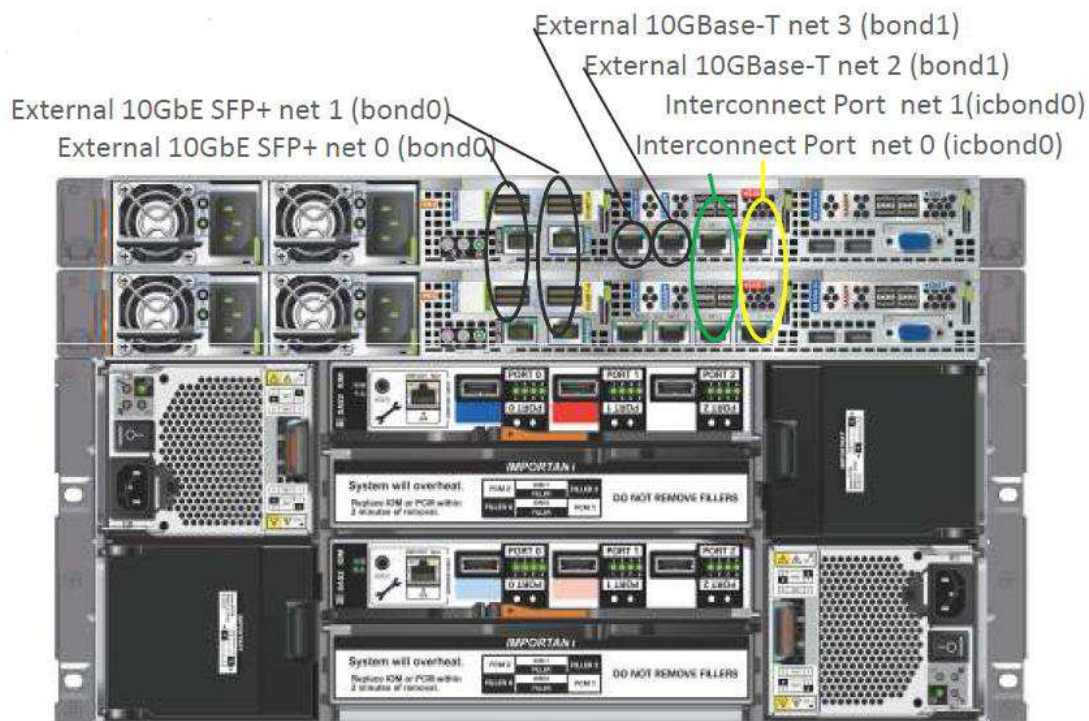
- InfiniBand Interconnect
- 10 GBase-T (copper) Public Networking



# Oracle Database Appliance

## Optionale Verkabelung für SFP+ (Public Fiber)

- Replace InfiniBand w/Fiber PCIe cards
- Interconnect w/on-board Net0 & Net1 ports



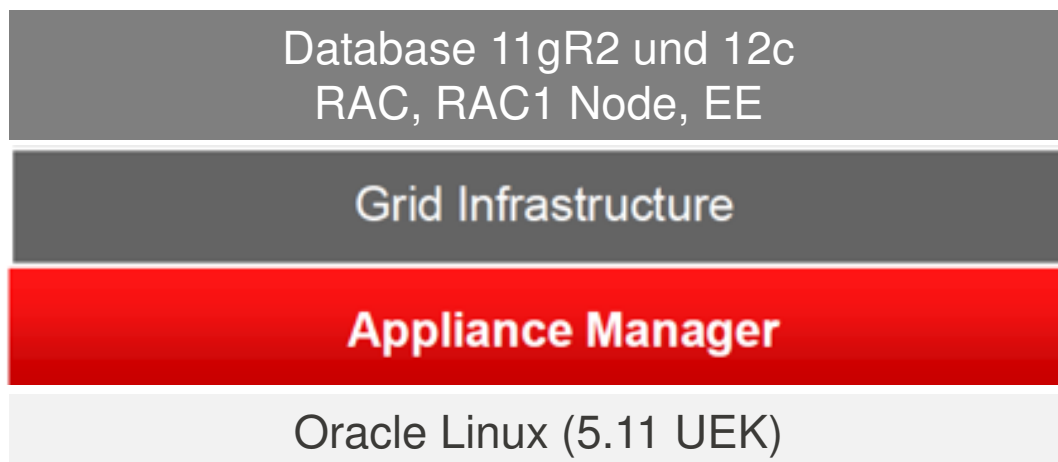
# SOFTWARE

## Oracle Database Appliance



# Oracle Database Appliance

Zuverlässige Software



# Oracle Database Appliance

## Unterstützte Datenbank Releases

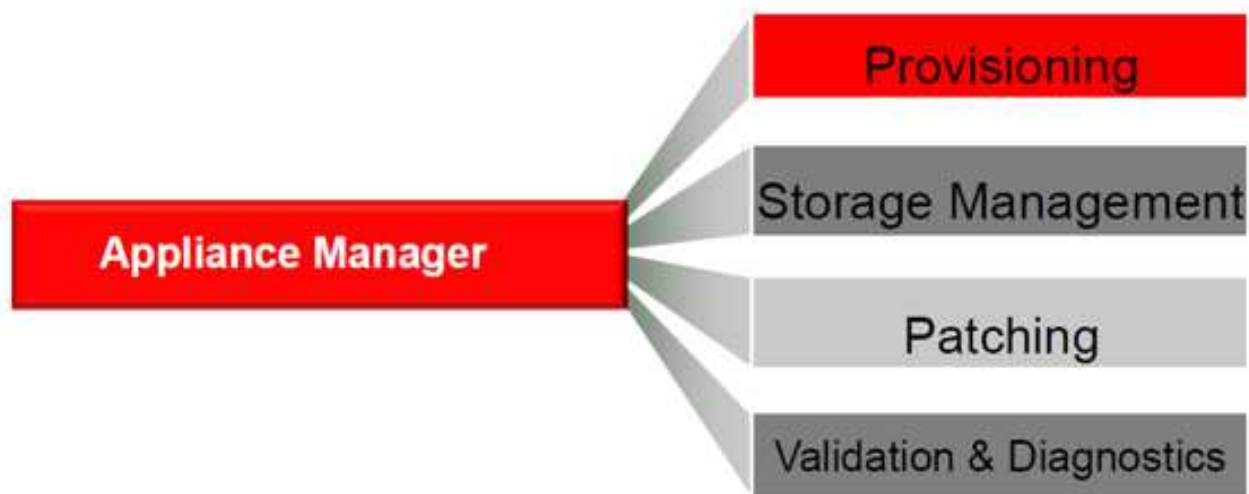
- Support für 12.1.0.2
- Support für 11.2.0.4.2, 11.2.0.3.10, sowie 11.2.0.2.12
- Download von ODA Datenbank Clone Dateien, um ältere Versionen von 11.2.0.3.x oder 11.2.0.2.x einzusetzen
  - Patch 14777276 – 11.2.0.3.X clone files
  - Patch 14349293 – 11.2.0.2.X clone files

# Oracle Database Appliance

- Support für Oracle Grid Infrastruktur Release 12.1.0.2.0, inklusive Oracle Database 12.1.0.2.0
- Support für Container Databases in Oracle Database 12c, 12.1.0.2.0, homes
- Support für „virtual disks“
- Support für „database snapshots“
- Support für „virtual machine snapshots“, die von Templates oder anderen virtuellen Maschinen erstellt werden
- Support für das Resizing von „Shared Repositorys“

# Oracle Database Appliance

## Software Komponenten



# Oracle Database Appliance

## Provisioning

- Keine Notwendigkeit der Installation oder Konfiguration des Betriebssystems
- Kein spezielles Know-how nötig, um die Clusterware und die Datenbank zu installieren
- Recherchen und bisher umfangreiche Such-Aktionen nach benötigten Patchsets und Patches erübrigen sich
- Vollständig getestet und validiert durch Oracle.

# Oracle Database Appliance

## Storage

- Zero Administrations Storage
  - LUN-Kreierung entfällt
  - Multipath-Setup entfällt
  - Diskgroup-Konfiguration entfällt
  - Keine Festplatten-Anpassung/en und Sektor-Optimierungen notwendig
- Im Fehlerfall einfach die Festplatte tauschen; die ODA erledigt alles Notwendige automatisch
- Hochoptimiertes Design unterstützt native Festplatten-Performance für die Datenbank.

# Oracle Database Appliance

## Patching

- Recherchen nach benötigten Patches entfallen
  - von der Firmware bis zur Datenbank
- Keine Notwendigkeit mehr die End-to-End Interoperabilität auszutesten
  - Oracle tut dieses bereits
- Kein Know-how nötig, um die einzelnen Komponenten zu patchen
  - „One Button“-Patching erledigt das

# Oracle Database Appliance

## Diagnostics

- ASR (Auto Service Request)
  - überwacht und initiiert im Hardware Komponenten Fehlerfall einen automatischen Service Request an Oracle Support
- System Check für alle Hardware- und Software-Komponenten
  - `./oakcli validate`
  - Überprüft Hardware- und Software-Komponenten und identifiziert schnell jedwede Anormalität oder Verletzungen der „Best Practise Compliance“
- Sammlung von Diagnose-Ergebnissen
  - `./diagcollect`
  - Sammelt alle relevanten Log-Dateien von Hardware- und Software-Komponenten ein und erzeugt ein komplettes Bundle für den Support um das Problem zu bestimmen.



# Lizenzierung ODA X5-2

## Oracle Database Appliance

# Oracle Database Appliance

## Wahl der Plattform

- **Bare Metal - Plattform**
  - Keine Virtualisierung.
  
- **Virtualized - Plattform**
  - Isolation zwischen Applikation und Datenbank
  - Oracle Database (ODA\_BASE - privilegierter Gast)
  - Oracle und Non-Oracle Produkte.

# Oracle Database Appliance

Lizenzierung– Pay As You Grow

- Core-Aktivierungsschritte Bare Metal & Virtualized- Platform



2 4 6 8 10 12 14 16 18 20 ... 36



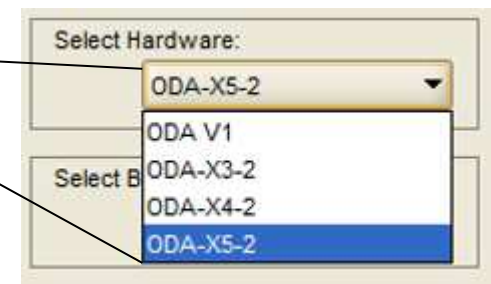
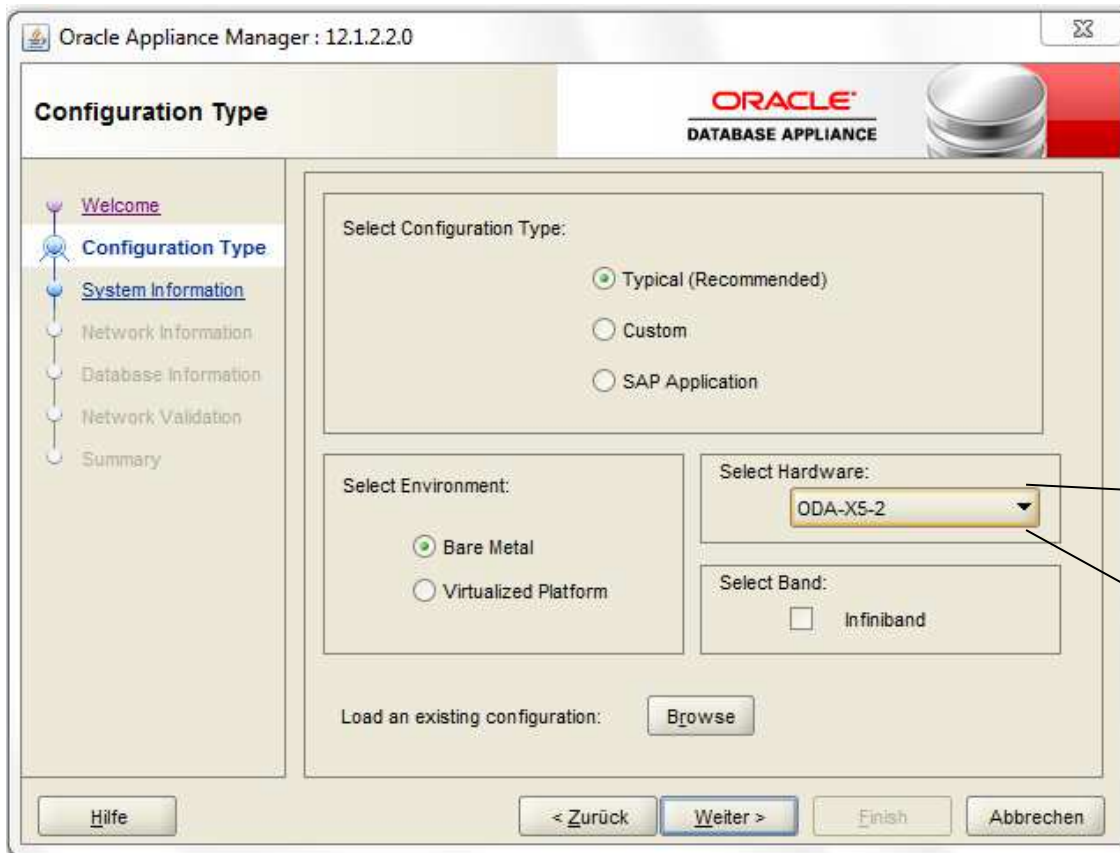
# Appliance Manager 12.1.2.2

## Oracle Database Appliance

# Oracle Database Appliance

## Oracle Appliance Manager

### Graphical User Interface OAM 12.1.2.2.0



# Oracle Database Appliance

## Oracle Appliance Manager

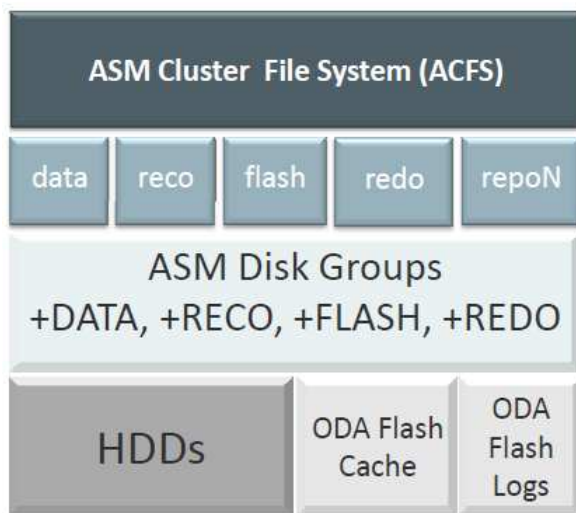
### Appliance Manager 12.1.2.2

- Supports database versions 11.2.0.2, 11.2.0.3, 11.2.0.4, 12.1.0.2
- MOS availability: targeting Feb 16<sup>th</sup>
- Supports all hardware versions of ODA
- Features for ODA X5-2
  - Storage Configuration Update
  - ODA Flash Cache
  - Database in Flash
  - Exafusion
  - ODA Fast Files
  - Fault Tolerant IMDB
  - Database Template changes

# Oracle Database Appliance

## Oracle Appliance Manager

### Appliance Manager 12.1.2.2, ODA X5-2 Storage Architecture



Disk	Disk Group	Volumes	Used For
HDD Outer Rings	+DATA	data	Database data files
HDD Outer Rings	+DATA	Repo1.. repoN	Shared Repository for VMs, VDisk
HDD Inner Rings	+RECO	reco	Database archive logs, RMAN backups (Fast Recovery Area)
HDD Inner Rings	+RECO	Repo1.. repoN	Shared Repository for VMs, VDisk
HDD Inner Rings	+RECO	cloudfs	Clustered file system – files that need to be accessed by either server node
ODA Flash Cache	+FLASH	flash	Database buffer cache, database files
ODA Flash Logs	+REDO	Redo	Database redo logs

# New Features ODA X5-2

## Oracle Database Appliance

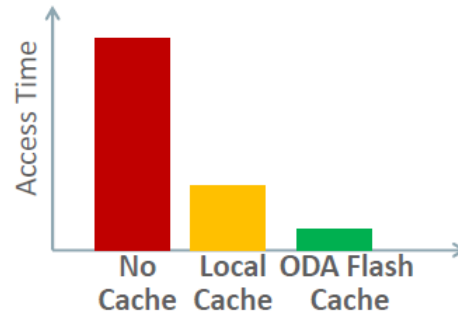


# Oracle Database Appliance

## New Features ODA X5-2

### ODA Fast Flash Cache

- ODA only feature
- Created by default in X5-2 with optimal sizing
- Speeds up reads up to 6x

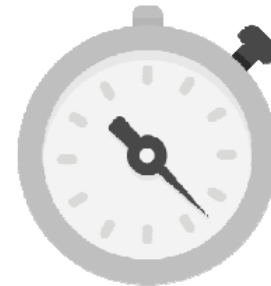


# Oracle Database Appliance

## New Features ODA X5-2

### Database in Flash

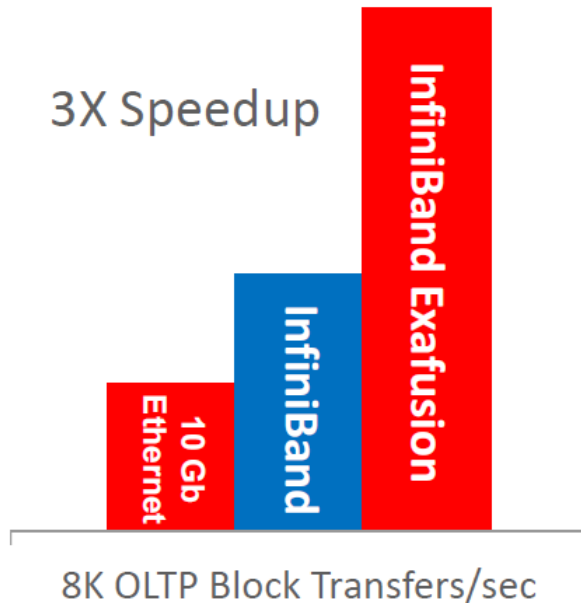
- ODA X5-2 specific feature
- Simple and easy to create - DB in flash and extend to disk
  - Leverage new flash storage
- Fully integrated with OAKCLI
  - All ODA functionality including database snapshot works out of the box
- Very high IOPS for the data stored in the flash



# Oracle Database Appliance

## New Features ODA X5-2

### Exafusion Direct to Wire OLTP Protocol



- InfiniBand has great throughput
  - But OS network stack per message overhead limits small message rate
- Exafusion re-implements RAC Cache Fusion
- Database **directly calls** InfiniBand hardware
  - Bypasses networking software stack, interrupts, scheduling

# Oracle Database Appliance

## New Features ODA X5-2

### ODA Flash Files

#### Provide Native File System Performance

- Stores file system metadata in flash
- Improves file system read and writes
- Native file system performance for snaps
- Sparse file support for ACFS



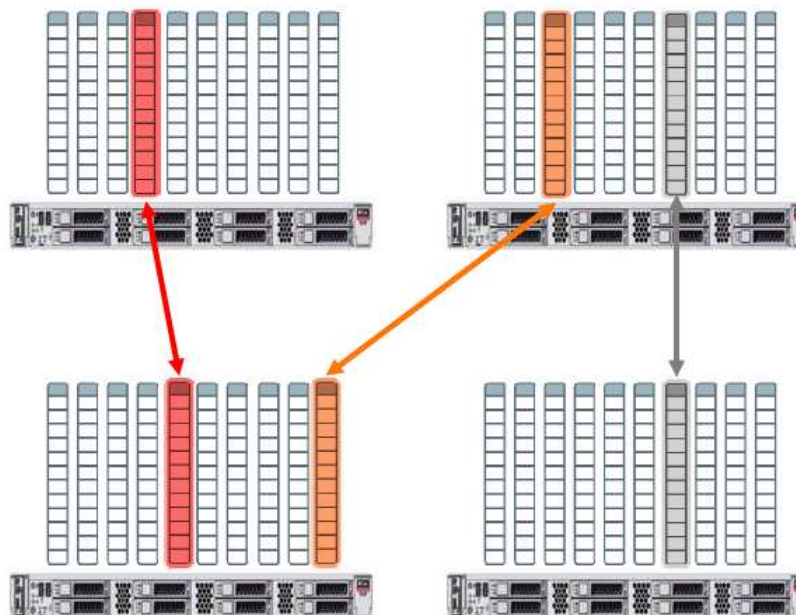
# Oracle Database Appliance

## New Features ODA X5-2

### ODA X5-2: In-Memory Fault Tolerance

#### Highest Availability for Database In-Memory Option

- Similar to storage mirroring
- Duplicate in-memory columns on another node
  - Enabled per table/partition
  - Application transparent
- Downtime eliminated by using duplicate after failure



# Oracle Database Appliance

## New Features ODA X5-2

### ODA Database templates

#### X5-2 enhancements

- Simplified naming convention
  - odb\_<cpu\_core>|<size>
- Support for X5-2 system with 72 CPU cores
- Works and behaves exactly same way in all prior generation of the HW
- Auto sizes ODA Fast Flash cache

# Oracle Database Appliance

## New Features ODA X5-2

### Provisioning – Oracle Database Appliance X5-2

#### OLTP Database Templates Sized for Performance

Database Class	CPU	Flash
odb-01s	1	12 GB
odb-01	1	24 GB
odb-02	2	48 GB
odb-04	4	96 GB
odb-06	6	144 GB
odb-12	12	288 GB
odb-16	16	384 GB
odb-24	24	512 GB
odb-32	32	768 GB
odb-36	36	768 GB

# Oracle Database Appliance

## New Features ODA X5-2

### Database creation

#### Enhancements

- OAKCLI integration to create
  - OLTP, DW, and In-Memory Database

```
oakcli create database -db mydb -oh OraDb12102_home1
Please enter the 'root' password .....
Please select one of the following for Database type [1 .. 3]:
1 => OLTP
2 => DSS
3 => In-Memory
3
Selected value is : In-Memory
```

- Support for all template sizes
- Auto sizes ODA Fast Flash cache
- Auto sizes IMDB cache



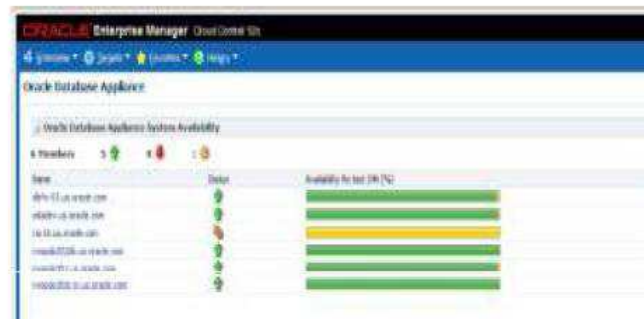
# Oracle Database Appliance

## New Features ODA X5-2

### Easier enterprise-grade management

#### Lower OpEx

- Enterprise Manager Plug-in
  - Manage ODA along with other data center assets using Enterprise Manager
  - Monitor and manage multiple database appliances
  - Aggregated analytics across multiple database appliances
- Wizard simplifies Enterprise Manager deployments
  - Easy to implement Enterprise Manager on a highly available appliance



# VIRTUALISIERTE PLATTFORM

## Oracle Database Appliance

# Oracle Database Appliance

## Was ist die ODA Virtualisierte Plattform ?



- Option die ODA mit Oracle VM-Funktionalitäten zu erweitern
- Einsatz von Oracle VM, um jeden Server zu partitionieren und mehrfachen Workload zu hosten
- Bietet die Lösung für
  - Effizientes Plattform-Sharing mit einer oder mehreren Applikationen
  - „Capacity On Demand“-Lizenzierung für Datenbank und Applikationen
  - „Up-and-Down“-Core Zählung
  - Isolation zwischen Datenbank- und Applikations-Workload.
  - VM Auto Restart & VM Failover HA.

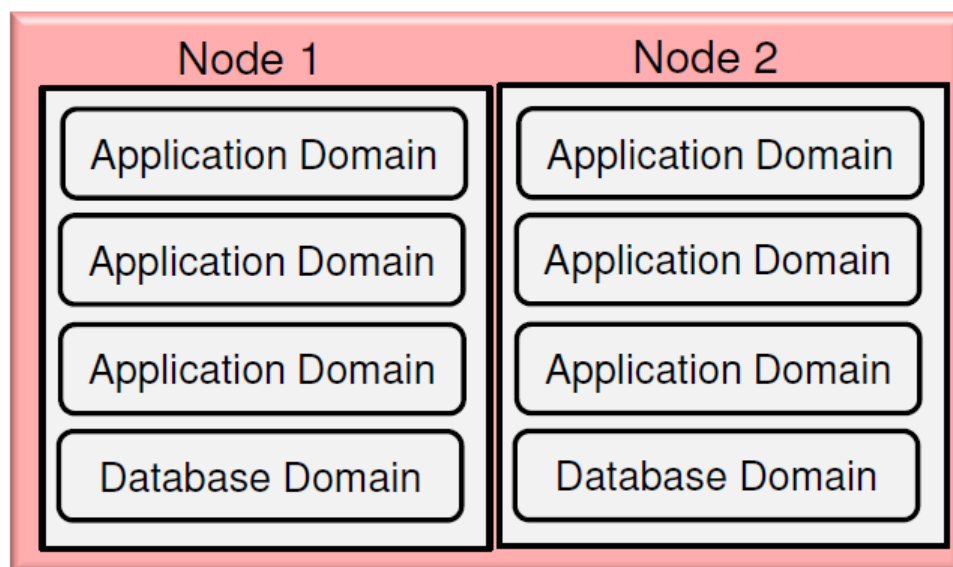
# Oracle Database Appliance

## Wie arbeitet die Virtualisierte Plattform ?

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### Ein Server für Datenbank und Applikationen

**VM**



- Datenbanken laufen in einer einzigen Domain (ODA\_BASE).
- Application VMs laufen im Shared Repository.
- Größe des Repository ist allein abhängig von verfügbarem Speicherplatz
- Automatischer VM-Startup ist möglich.

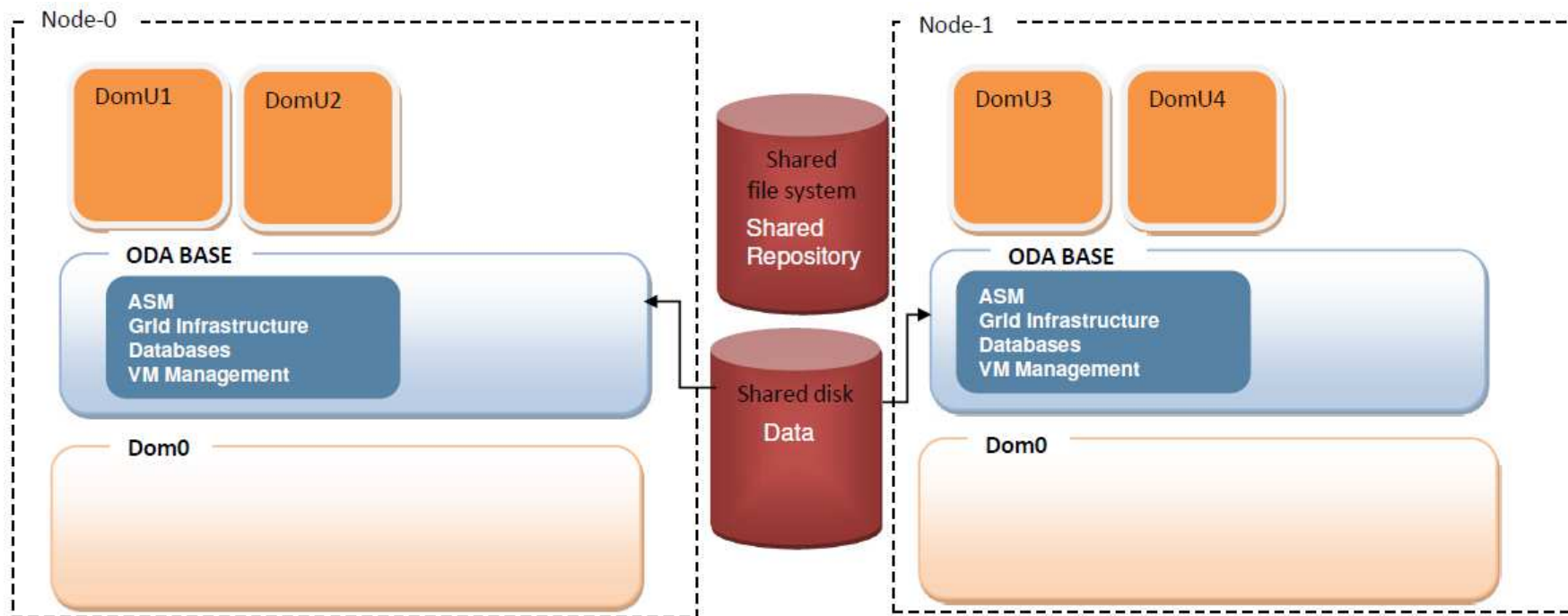
# Oracle Database Appliance

## Wie arbeitet die Virtualisierte Plattform ?

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### VM Auto Restart & VM Failover HA

VM



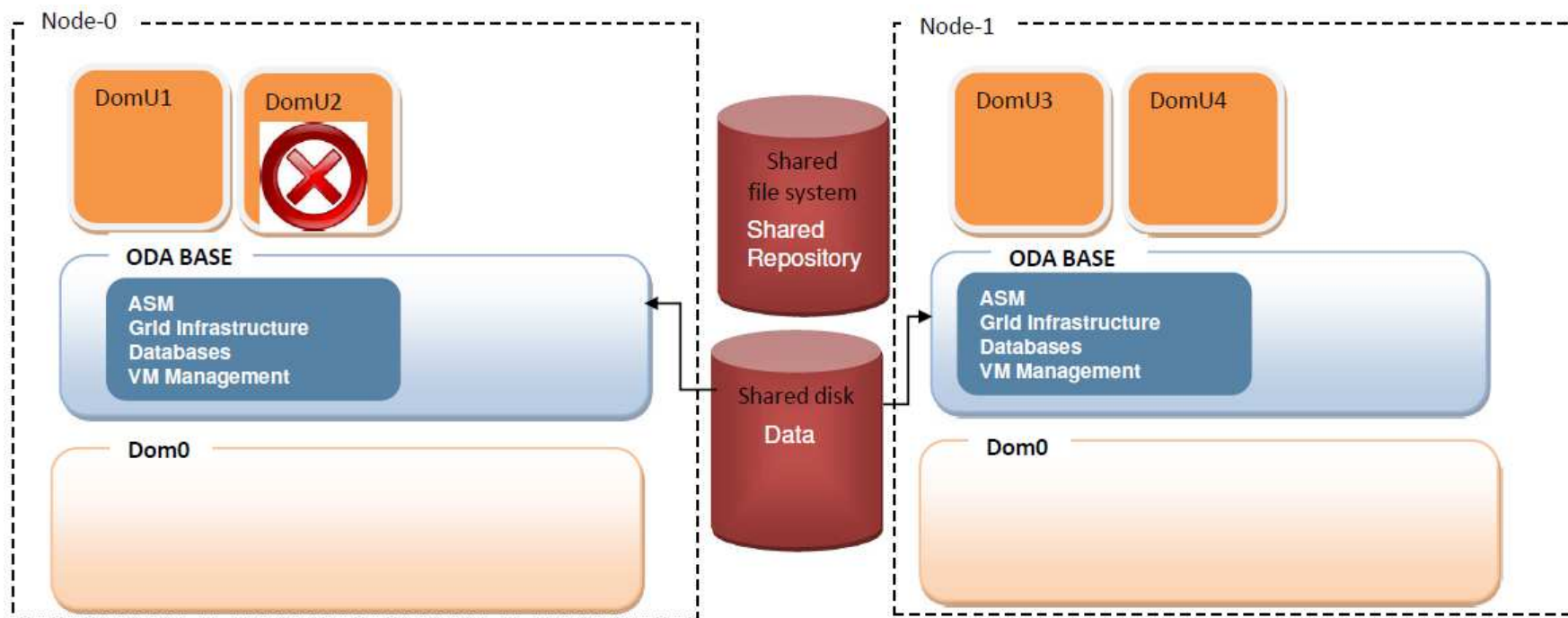
# Oracle Database Appliance

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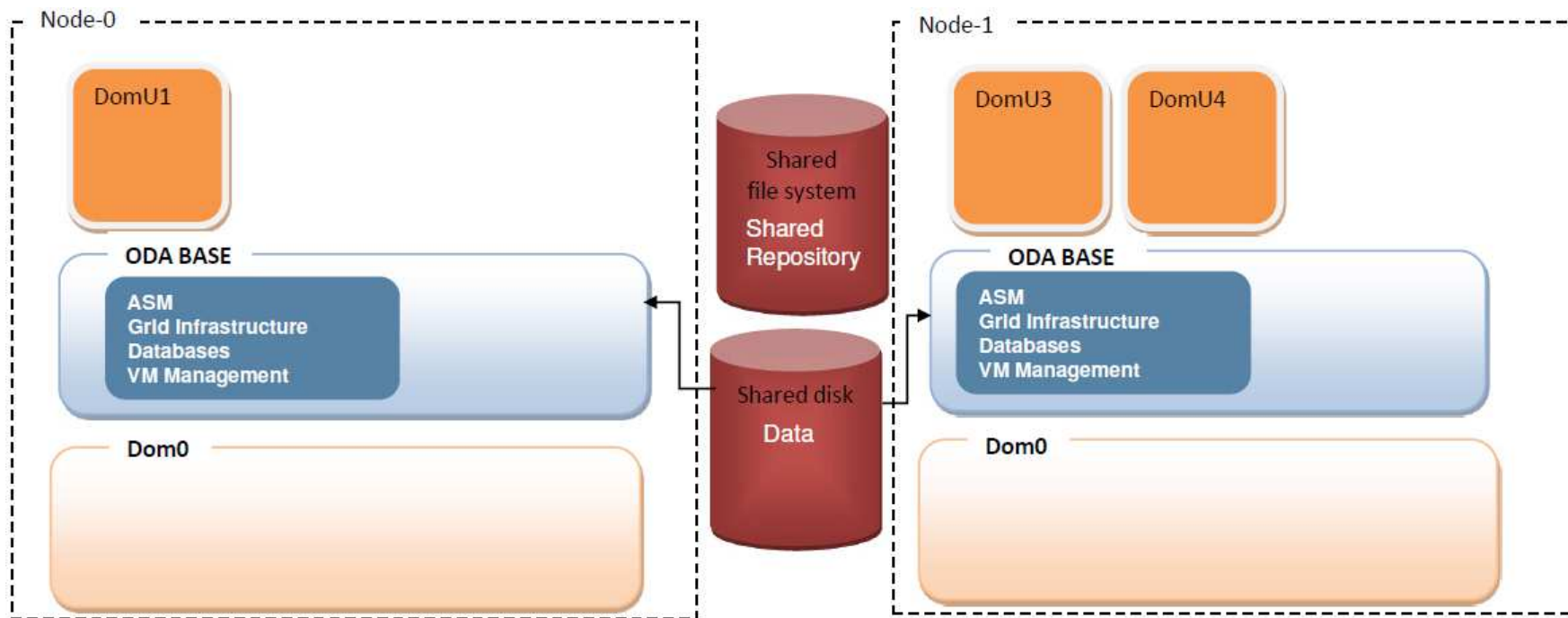
# Oracle Database Appliance

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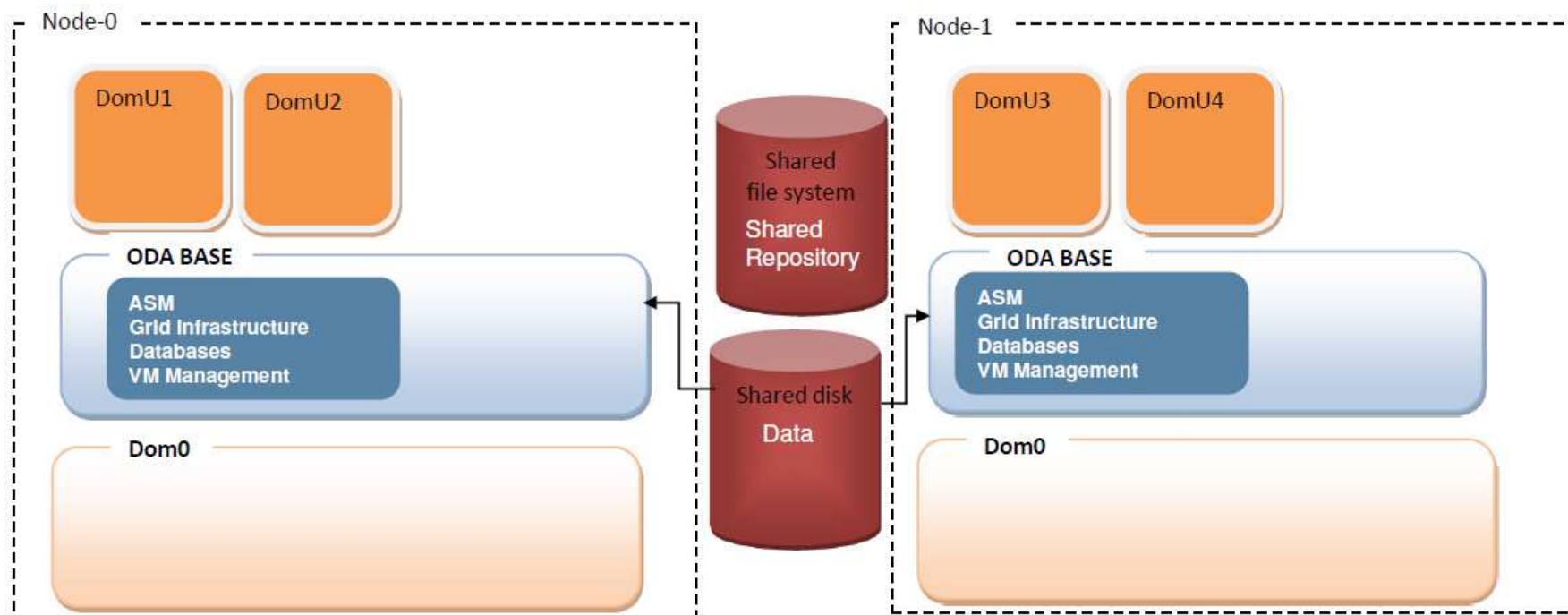
# Oracle Database Appliance

## Wie arbeitet die Virtualisierte Plattform ?

### VM Auto Restart & VM Failover HA

**ORACLE®**

**VM**





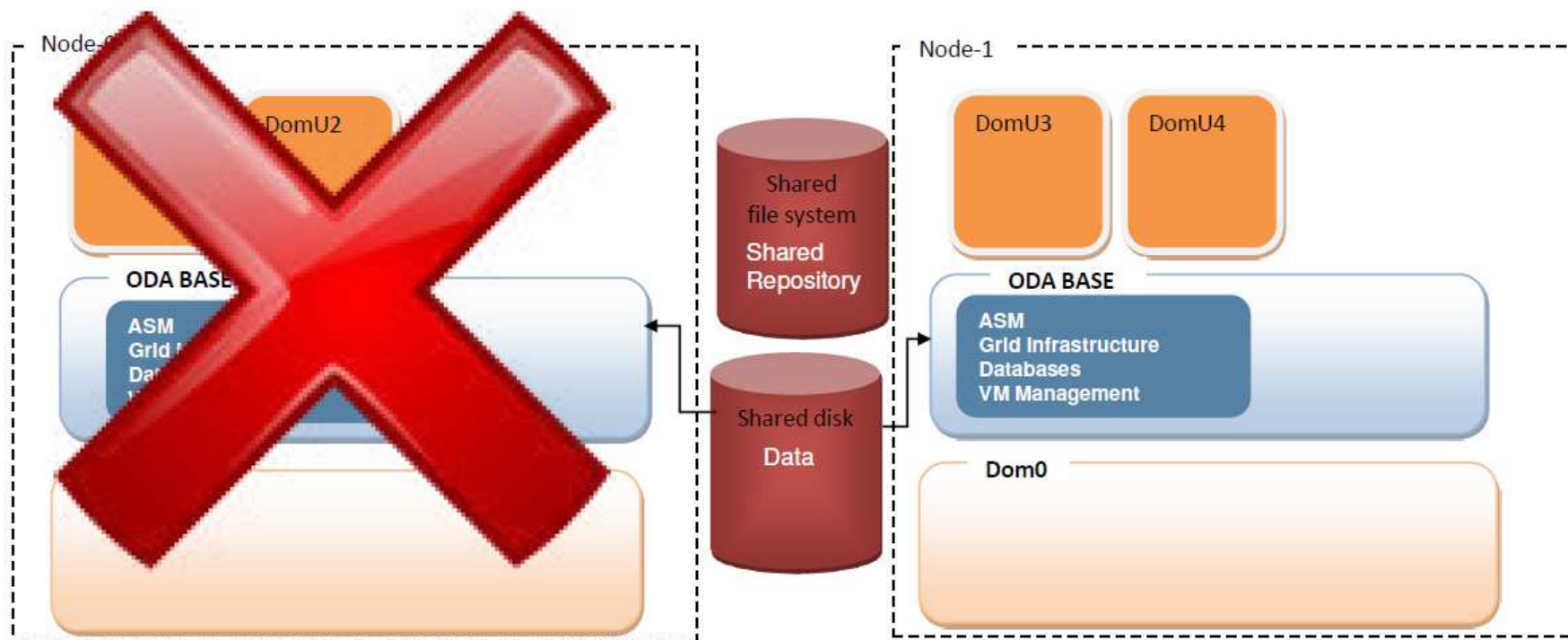
# Oracle Database Appliance

## Wie arbeitet die Virtualisierte Plattform ?

### VM Auto Restart & VM Failover HA

ORACLE®

VM



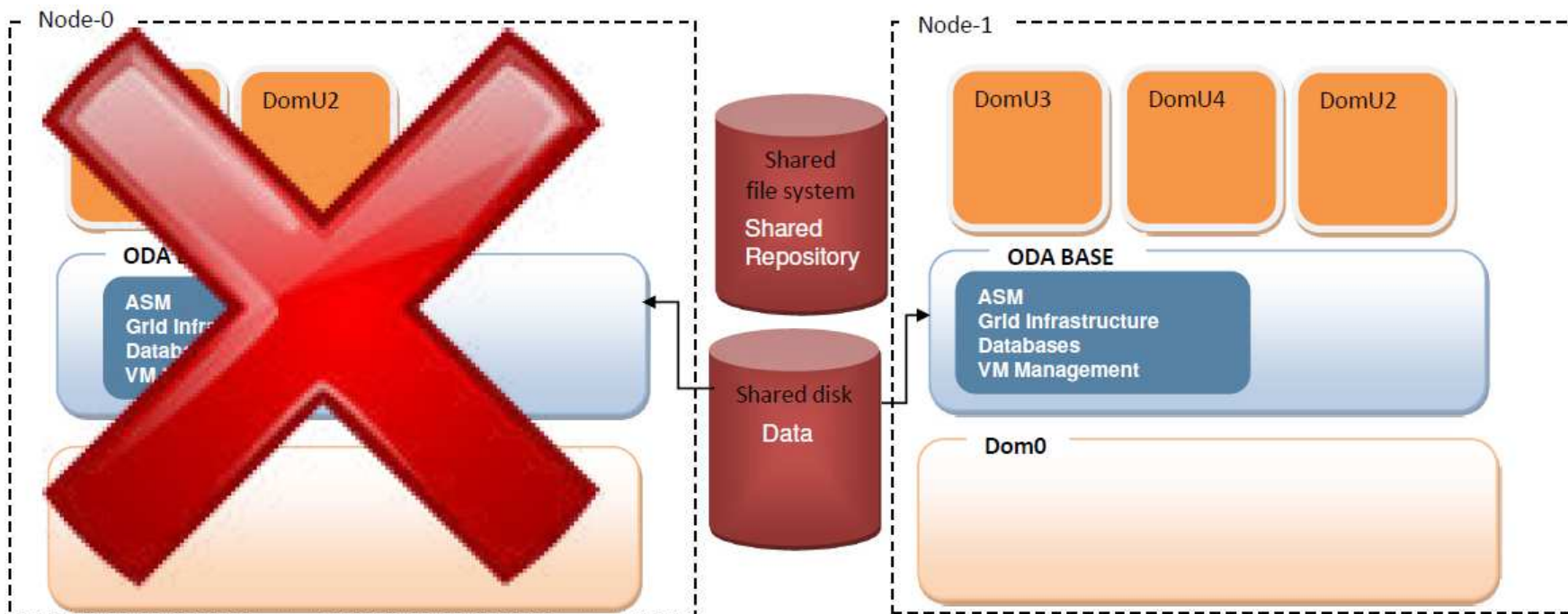
# Oracle Database Appliance

Wie arbeitet die Virtualisierte Plattform ?

VM Auto Restart & VM Failover HA

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VM



# VLAN Support

## Oracle Database Appliance

# Oracle Database Appliance

## VLAN Support

bietet gesicherte Netzwerkisolierung für vielfachen Workload durch gemeinsame Netzwerk(auf)teilung

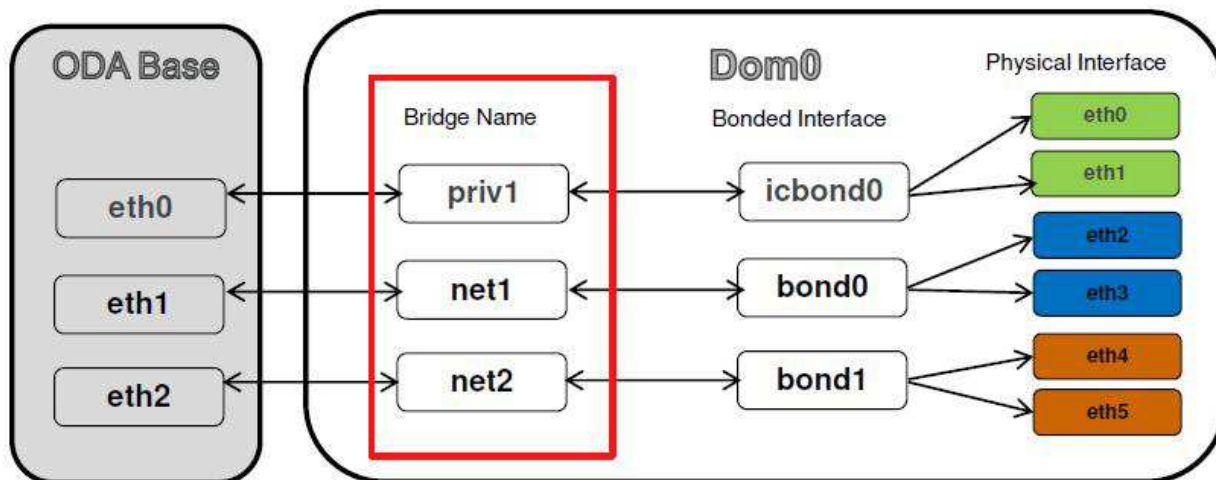


- Server besitzen eine endliche Anzahl von Netzwerken – die ODA X5-2 besitzt 2 „bonded“ Netzwerk Interfaces für den Kundenbedarf.
- Im Fall der Notwendigkeit mehrere Netzwerke zu nutzen, müssen ein oder mehrere Netzwerk Interfaces für die gemeinsame Nutzung geteilt werden.
- VLANs erlauben diese gemeinschaftliche Nutzung eines Netzwerk Interfaces und bieten zusätzlich sichere Isolation, d.h. Paket-Sniffings von unterschiedlichen Workloads sind nicht möglich.

# Oracle Database Appliance

## VLAN Support

### ODA X5-2 VM Vernetzung



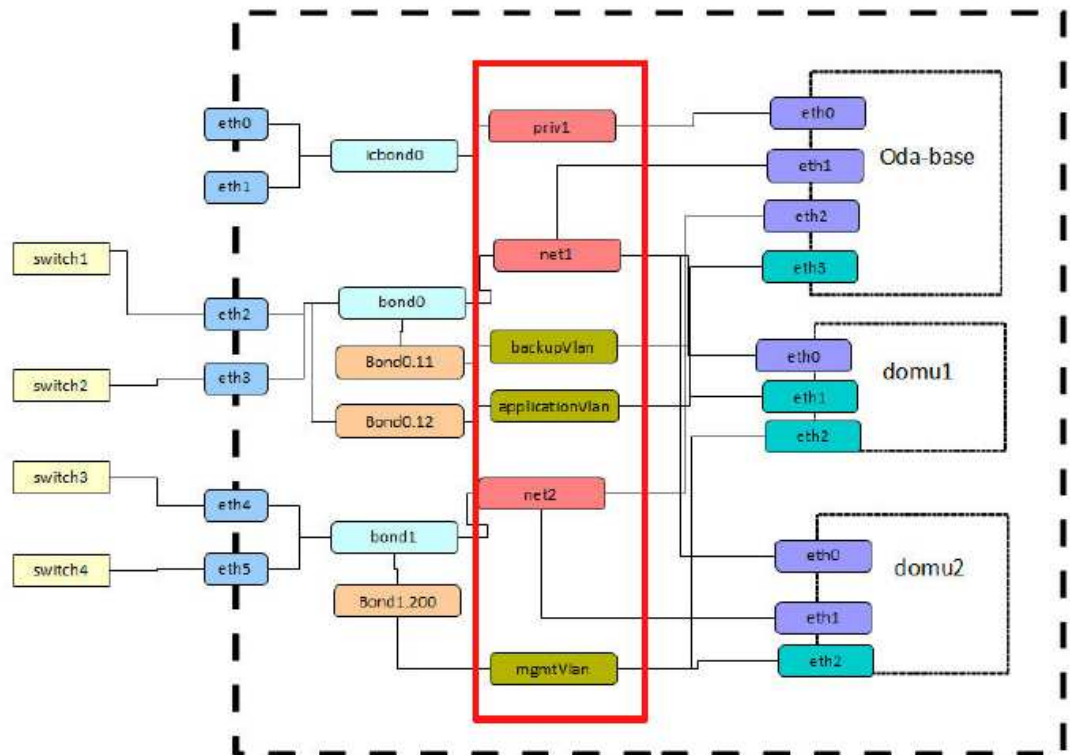
# Oracle Database Appliance

## VLAN Support

### ODA VM Netzwerk mit VLAN Beispiel

#### Network Requirement

- Management access – provide access to highly privileged DBAs
- Backup Network – RMAN backup access
- Application access – application Traffic



# Engineered Systems Continuum

## Oracle Database Appliance



# Oracle Database Appliance

## Oracle Database Engineered Systems Continuum

**Engineered for  
Extreme Simplicity**



Oracle Database Appliance



Eighth Rack

**Engineered for Extreme Performance**

Quarter Rack

Half Rack

Full Rack



# Oracle Database Appliance

**Einfach,  
Zuverlässig,  
Bezahlbar.**

**ORACLE®**

- Einfach zu installieren, zu managen und zu unterhalten
- Best-in-class Verfügbarkeit
- Best-in-class Performance
- Best-in-class Skalierbarkeit
- Capacity-on-demand Lizenzierung
- Solution-in-a-Box





# Vielen Dank.

## **MT AG License Services**

Balcke-Dürr-Allee 9  
40882 Ratingen

Telefon: +49 (0) 21 02 309 61-137  
Telefax: +49 (0) 21 02 309 61-555

E-Mail: [LICENSE@mt-ag.com](mailto:LICENSE@mt-ag.com)  
[www.mt-ag.com](http://www.mt-ag.com)