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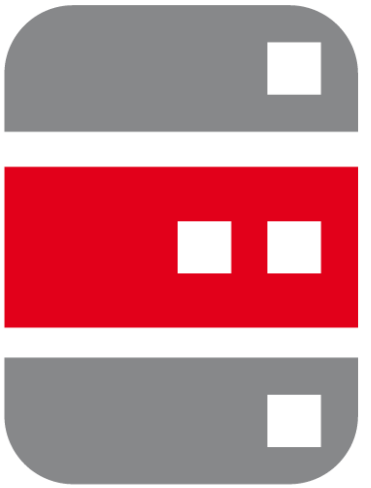

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42 Fakten zu Oracle RAC, Grid Infrastructure und ASM

Martin Klier 

Performing Databases GmbH
Mitterteich / Germany

Speaker

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- Martin Klier
- Solution Architect and Database Expert

- My focus
  - Performance Optimization
  - High Availability
  - Architecture DBMS

- Linux since 1997
- Oracle Database since 2003

ORACLE ACE

Speaker

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- Meet & Greet

DOAG
Regionalgruppen
Fachkonferenzen
DOAG Konferenz & Ausstellung

IOUG
independent oracle users group

COLLABORATE

- Contact: martin.klier@performing-db.com
- Weblog: http://www.usn-it.de (English)

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  - Concept
  - Planning & Sizing
  - Licensing
  - Implementation and Troubleshooting
- Get in touch
  - Performing Databases GmbH
    Wiesauer Straße 27
    95666 Mitterteich, GERMANY
  - Web: http://www.performing-databases.com
  - Twitter: @PerformingDB

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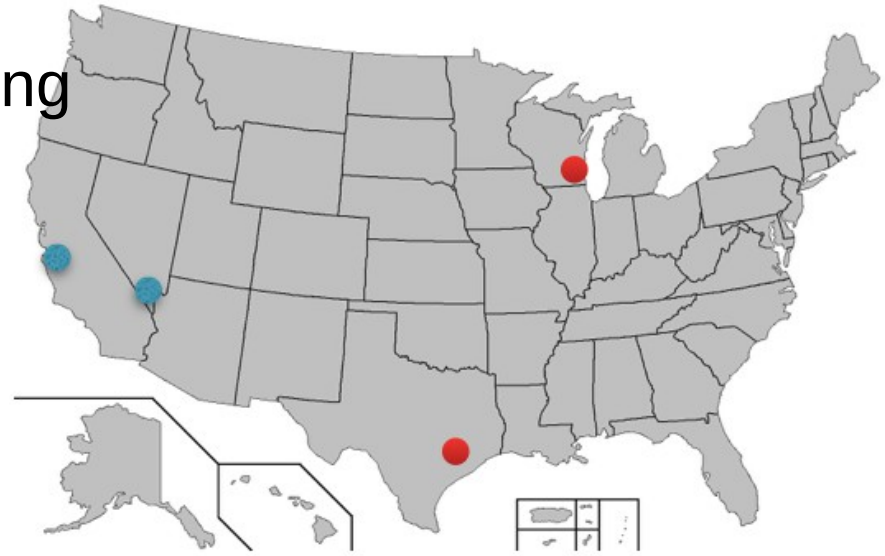

http://www.performing-databases.com

Tally-Ho!

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Seid Ihr Helden oder Memmen?

Memmen, aber ganz harte!

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Basics

Database

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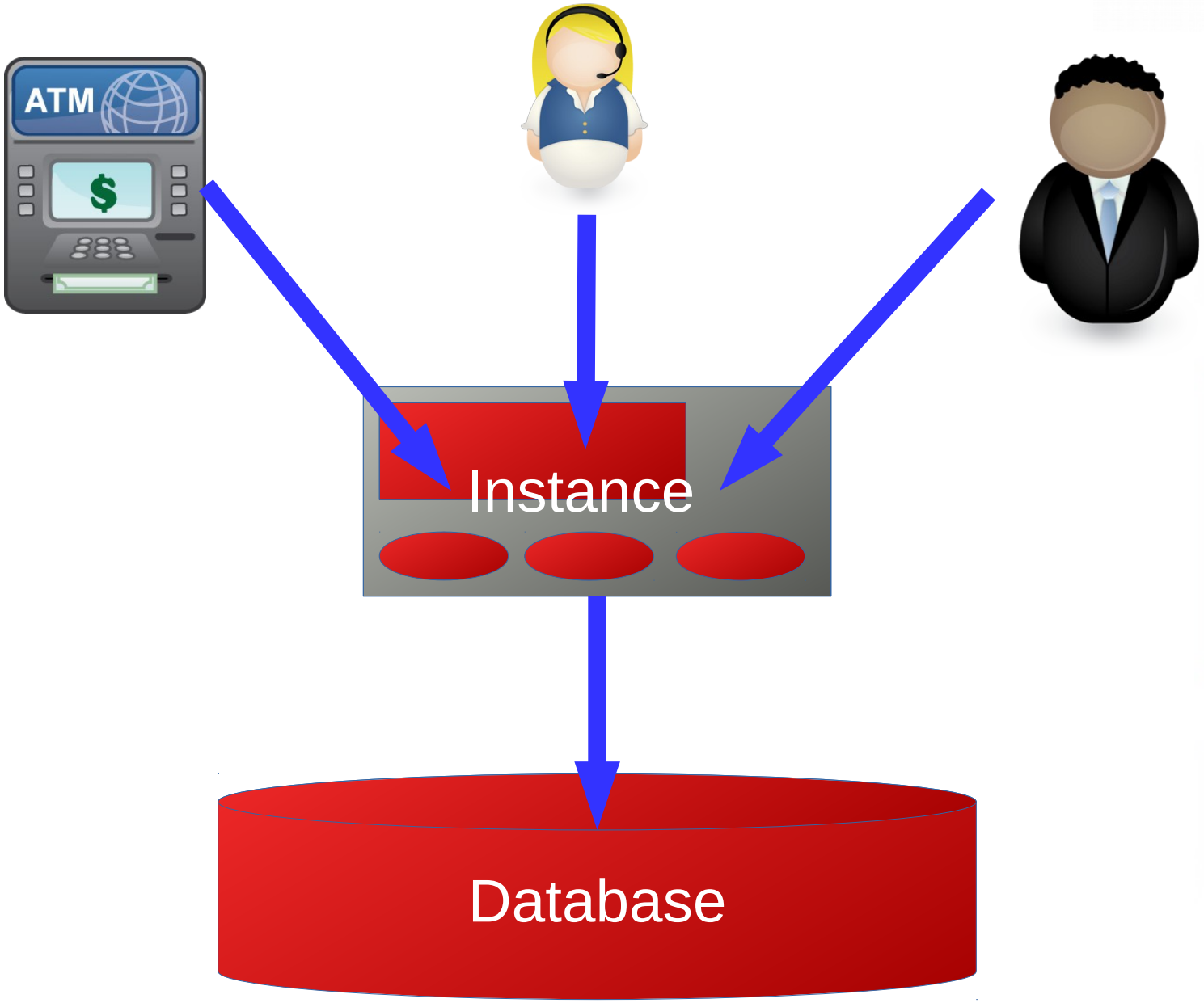

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RAC

RAC

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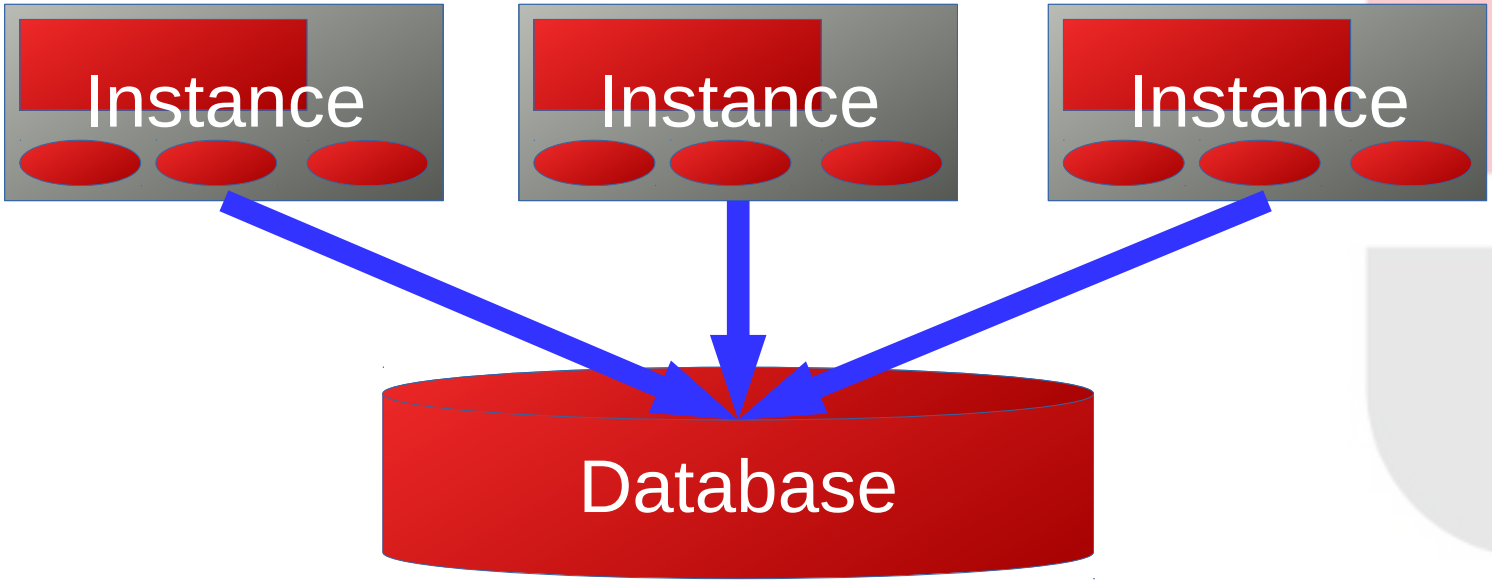
- Real Application Clusters
  = Produkt

- Real Application Cluster
  = Grid Infrastructure + Datenbank
  mit mehreren möglichen Instanzen



RAC

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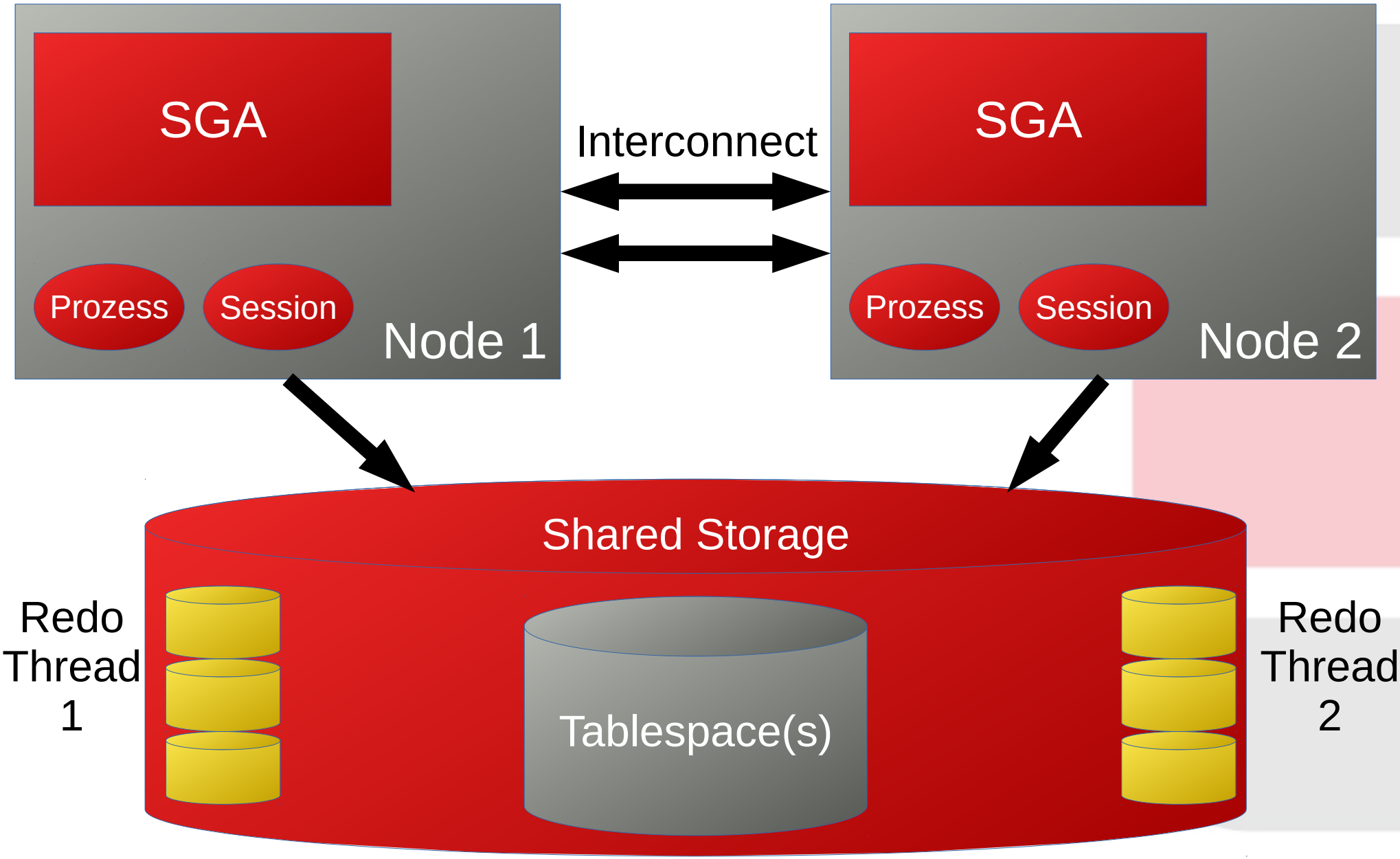
- Shared-Everything-Architektur
  (jedes Node sieht alle Daten)
- Queries liefern auf allen Nodes gleiche Ergebnisse
- CacheFusion
  (US Patent US20060117074 A1 von Ahmet K. Ezzat)
  erzeugt virtuellen Gesamt-Cache
  (aber on demand => Block Shipping)
- Parsing erfolgt Node-spezifisch (Skalierung!)
  Ausführungspläne unterscheiden sich ggf.

Grundfunktion



Listener

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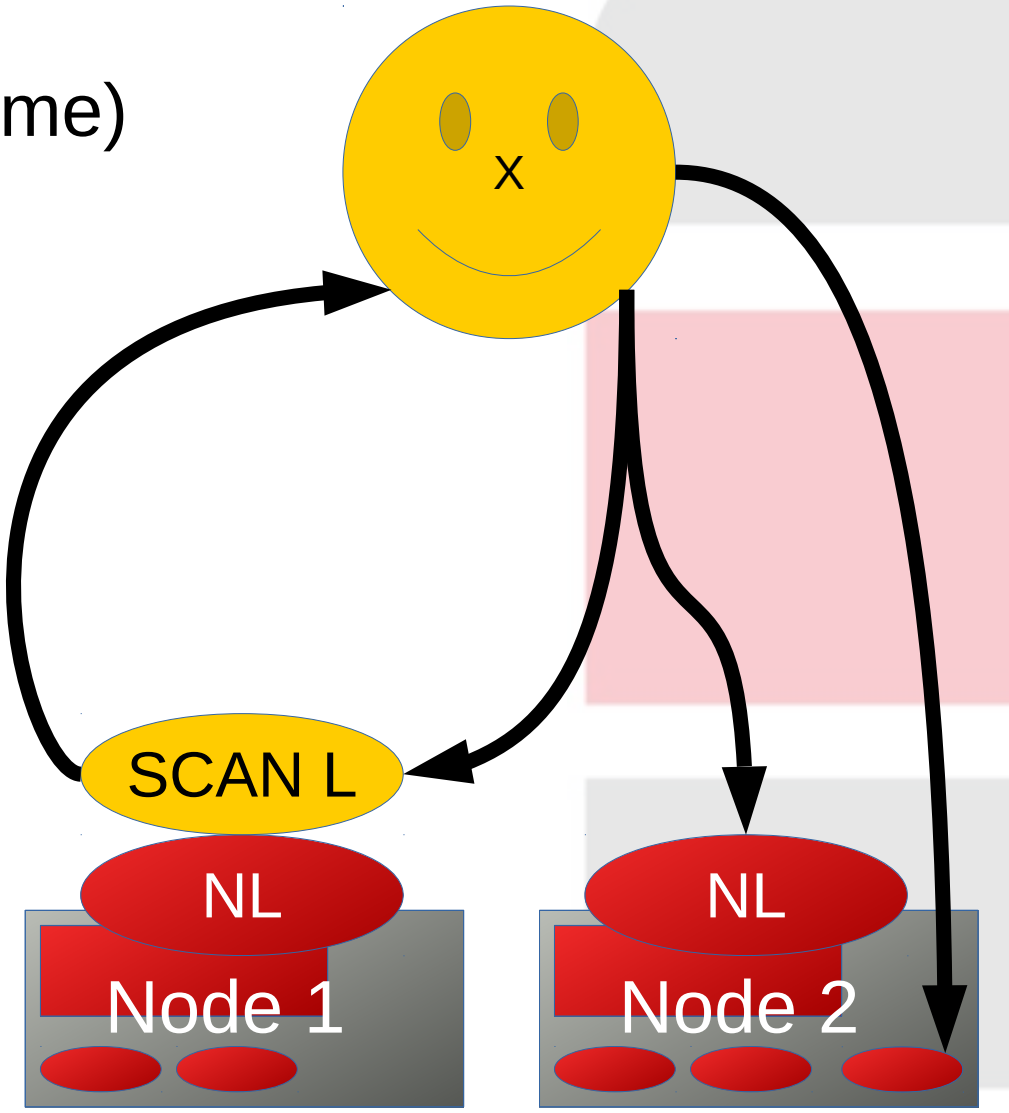
- SCAN Listener (11.2)
  (Single Cluster Access Name)
- Standard: 3x SCAN
  Praxis: 1x reicht zu 95%
- Node-Listener



RAC Performance

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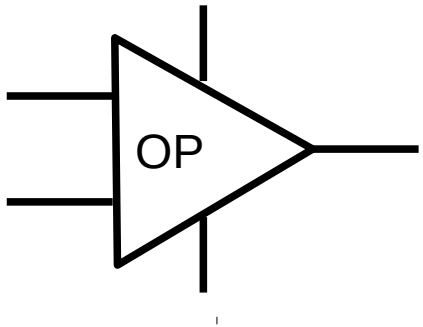
- RAC = Verstärker :)



- Sequenzen
  - ordered
  - cached
- 1 Query nicht „größer“ als 1 Node
- Interconnect-Überlastung vermeiden

RAC Performance

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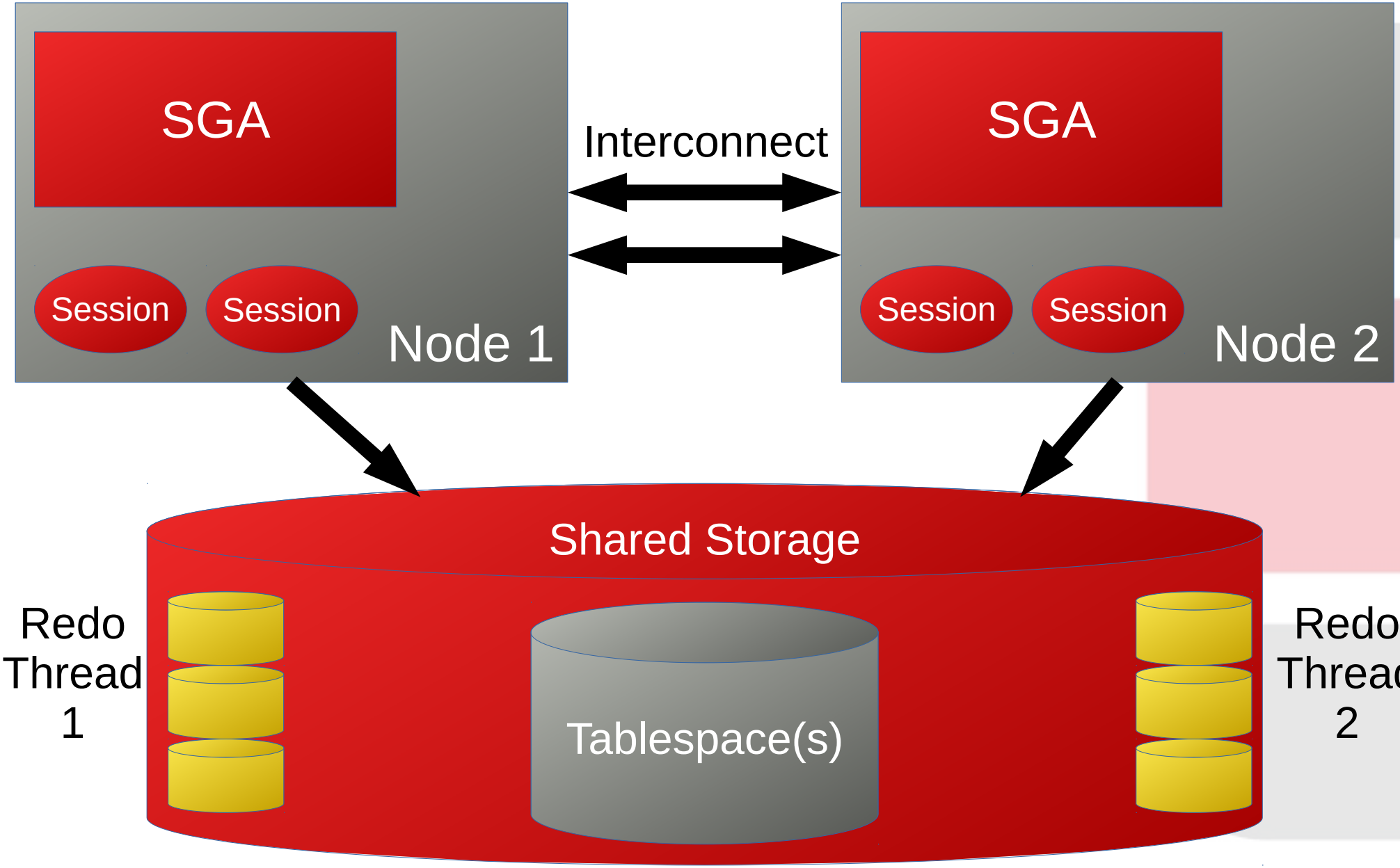

Diverses

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- Auto-DOP (Degree of Parallelism) im RAC
  => Verteilung PX Worker auf die Nodes
  Interessant für InMemory ohne Exa!

- InMemory IMCUs ohne Exa nicht redundant
  Grund: Implementiert mit RDMA
  => Geht nur mit Infiniband
  (Mellanox gibt nur für definierte Umgebung frei)

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ASM

ASM

- Automatic Storage Management
  = Produkt
- Logical Volume Manager
- Software-RAID
- Cluster - ~~Dateisystem~~
- **Cluster - LVM**

ASM

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- Verbindet Vorteile
  von Raw Devices (wenig Overhead)
  mit den von Dateisystemen (einfache Verwaltung)
- DB greift direkt auf Volumes zu
- Schlechter Ruf: Ich hätte gerne meine Datafiles <...>!
- „Menschenfreundliche“ Administration
  über diverse UIs
  (SQL*plus, asmcmd -p, EM CloudControl)

Classic I

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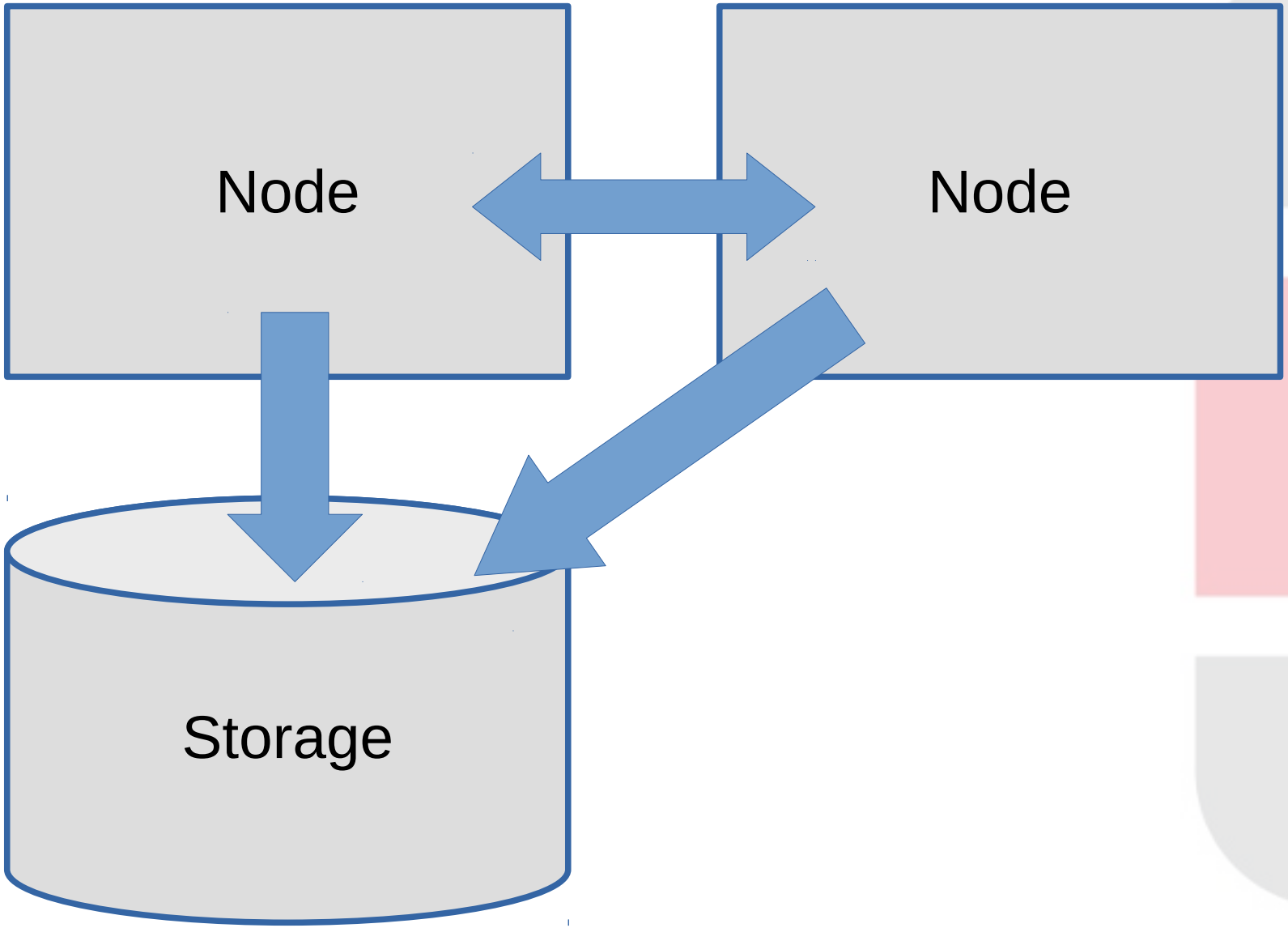

Classic II

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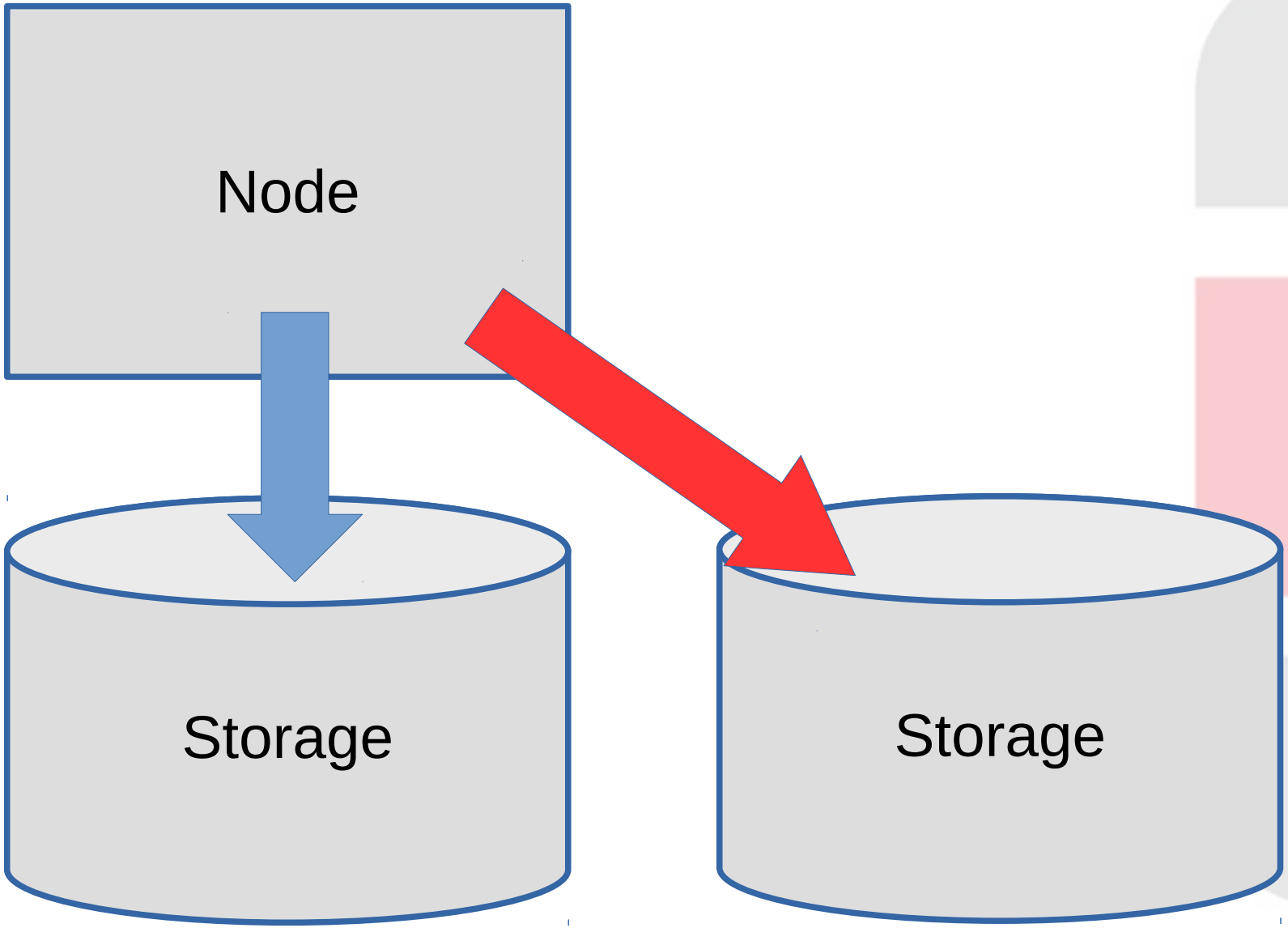

Classic III

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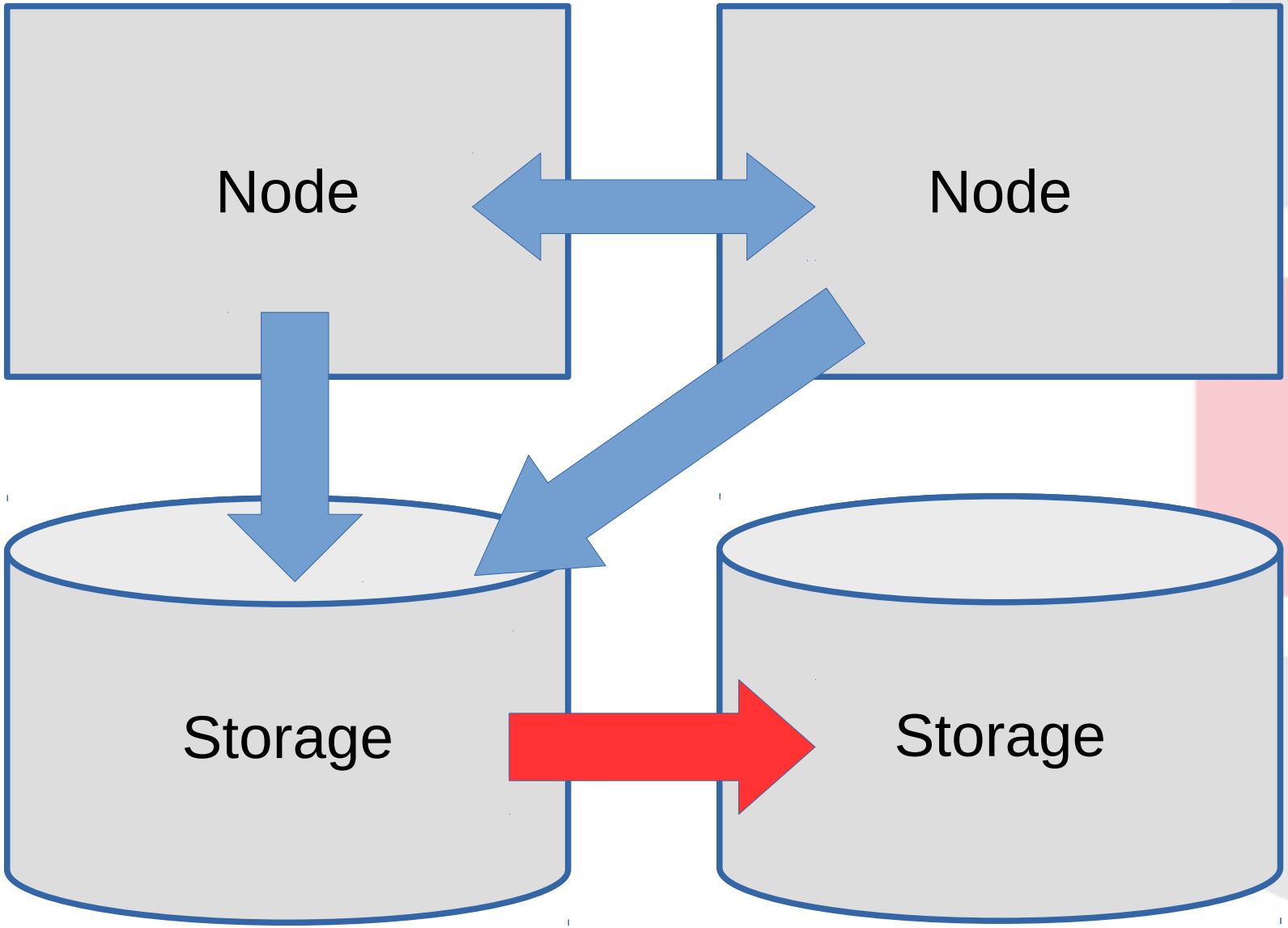

ASM++

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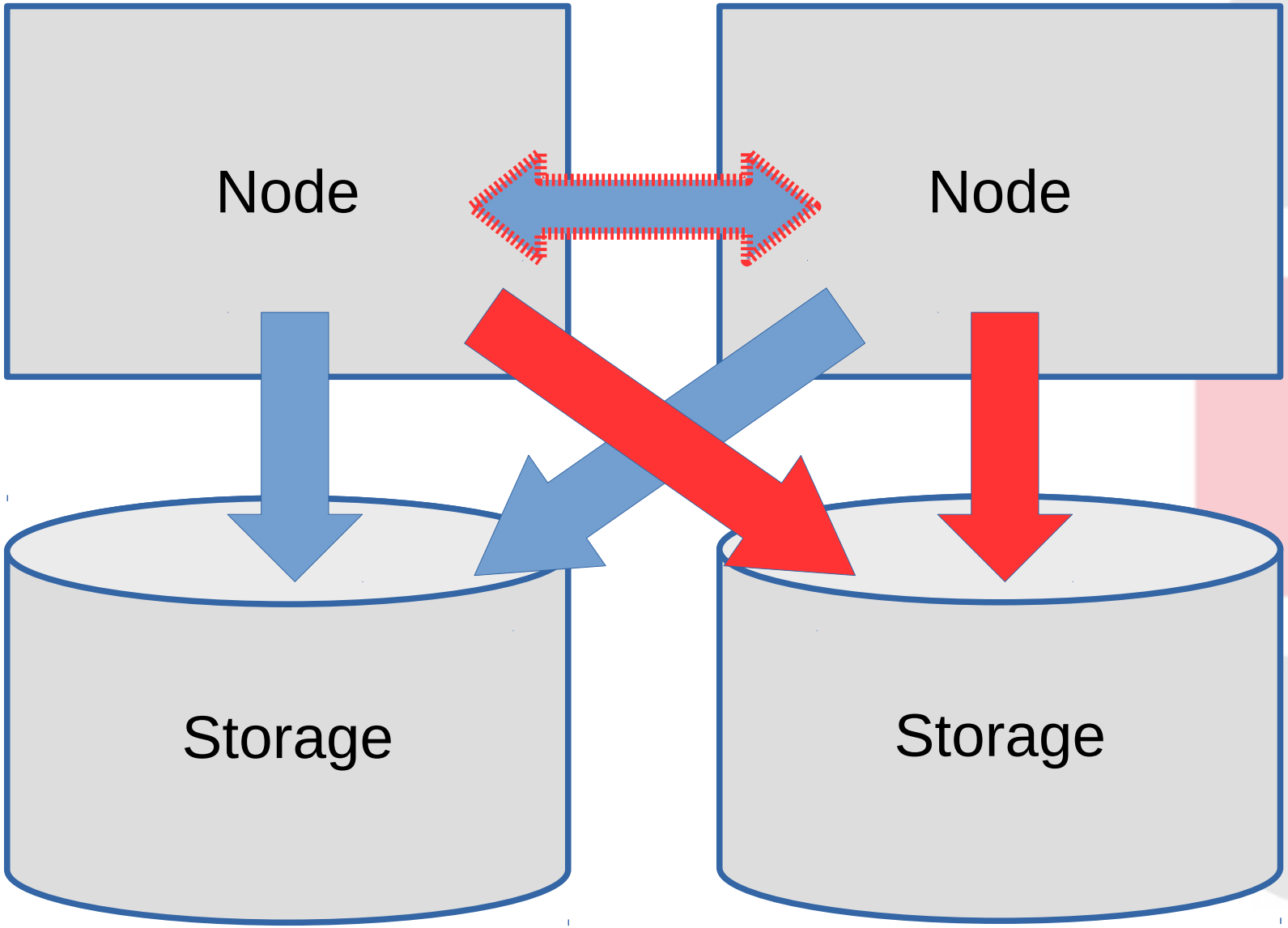

ASM Diskgroups

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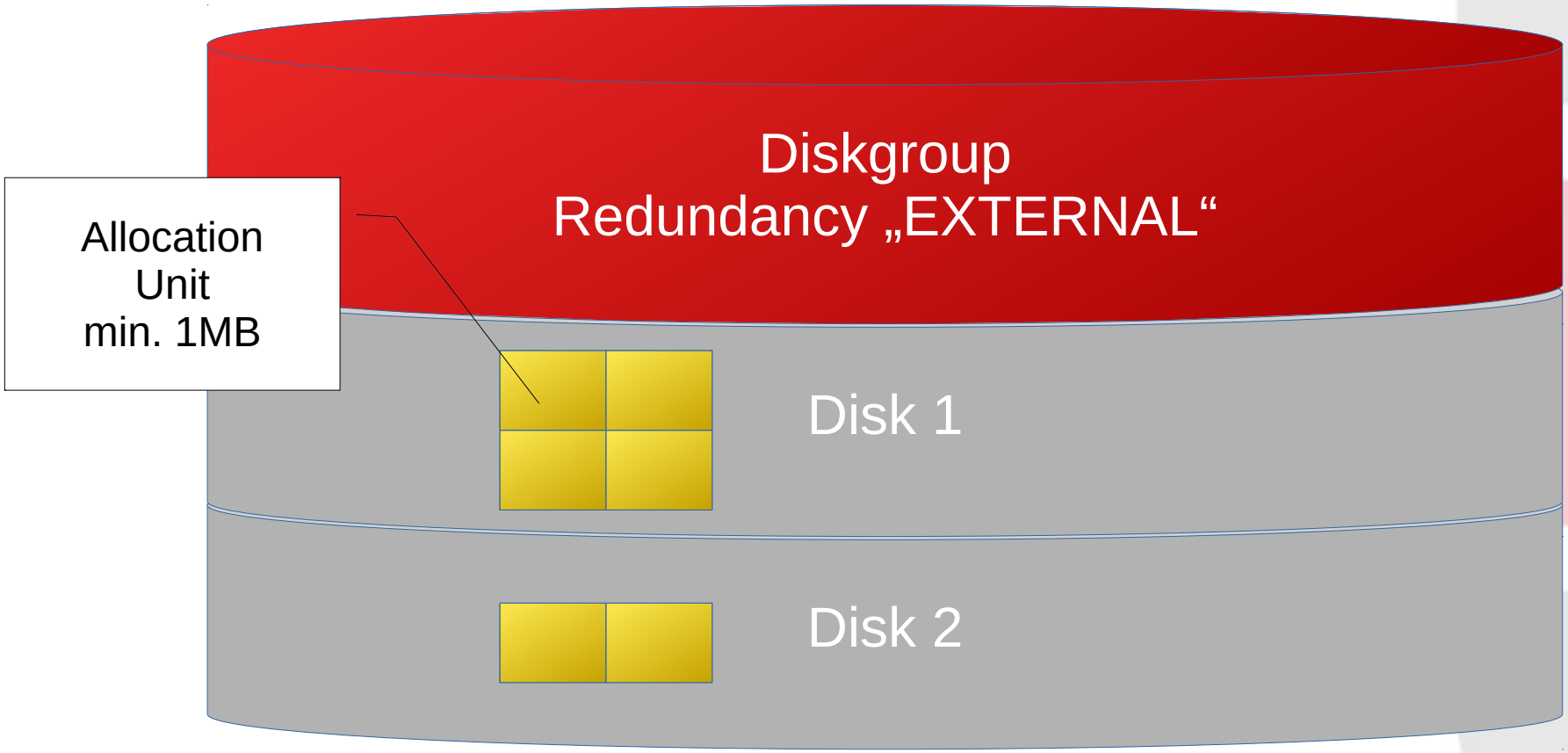

Disk 1 und 2 gleich groß wählen!

ASM Diskgroups

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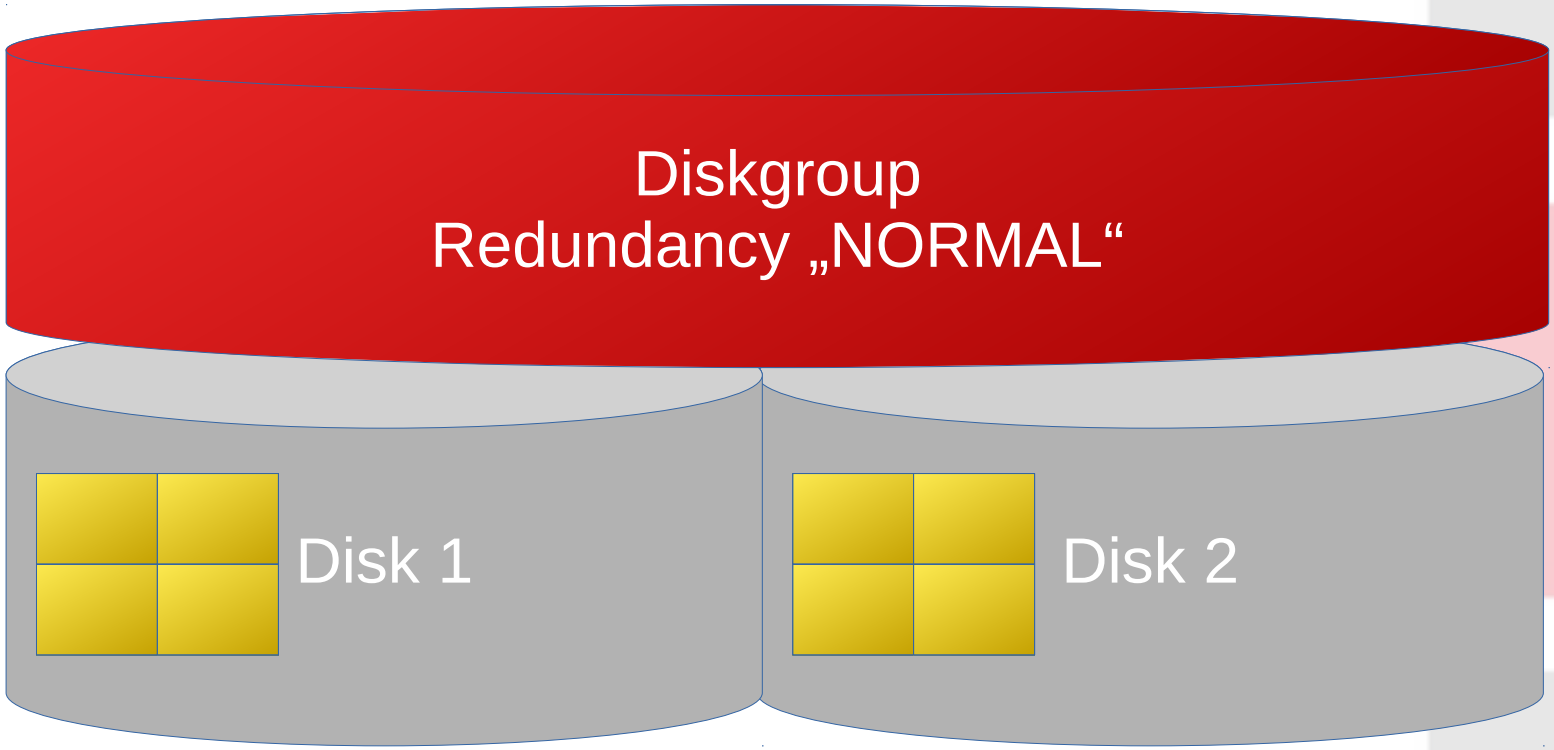

ASM Diskgroups

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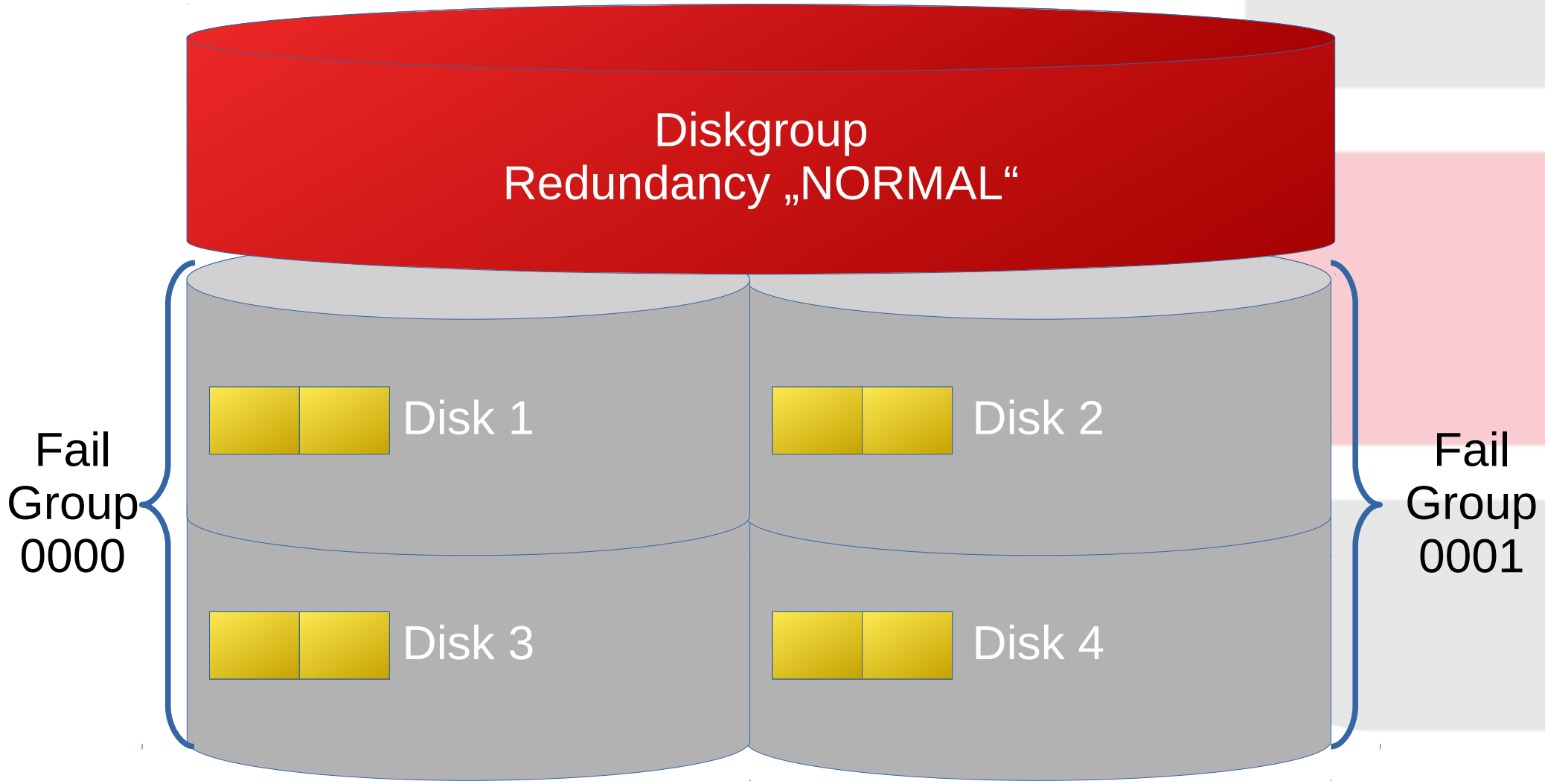

ASM

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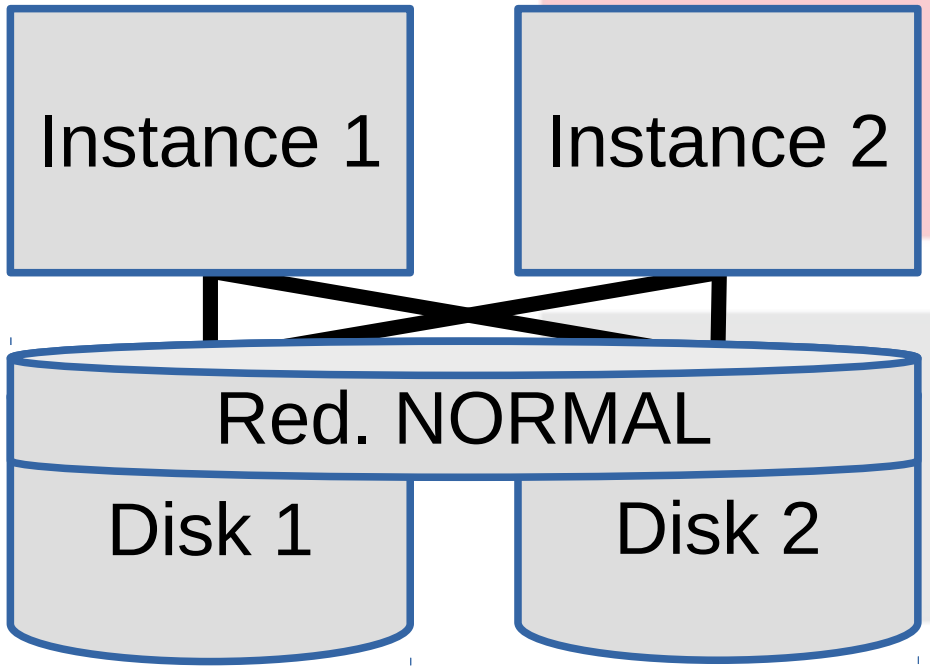
- Preferred Read Node (11g)
  erlaubt „local first“
- Even Reads (12c)
  liest regelmäßig von allen
  Disk-Spiegeln der DG



ASM Erfahrung

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- In >12 Jahren kein Datenverlust
  (aber es war knapp)
- Größtes Problem in 10.x
  Kurz „abwesende“ LUNs nicht dropped + rebalanced
- „Lösung“ mit 11.2
  - Event verbessert
  - DISK_REPAIR_TIME (drop delay)
- Größte Herausforderung
  Wiederkehrende LUNs erfordern manuellen Eingriff
  => Monitoring!

ASM 12.x

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- Flex Diskgroup
  - erlaubt Gruppierung nach Datenbank innerh. DG
  - ermöglicht Split-Mirror Sicherung pro DB innerh. DG
- ASM Service
  - zentralisiert das Management von Shared Disks für alle RACs einer Domäne
  - Zentraler Shared Disk Service („ASM über TNS“)
- Hoffentlich nicht nur für Exa!

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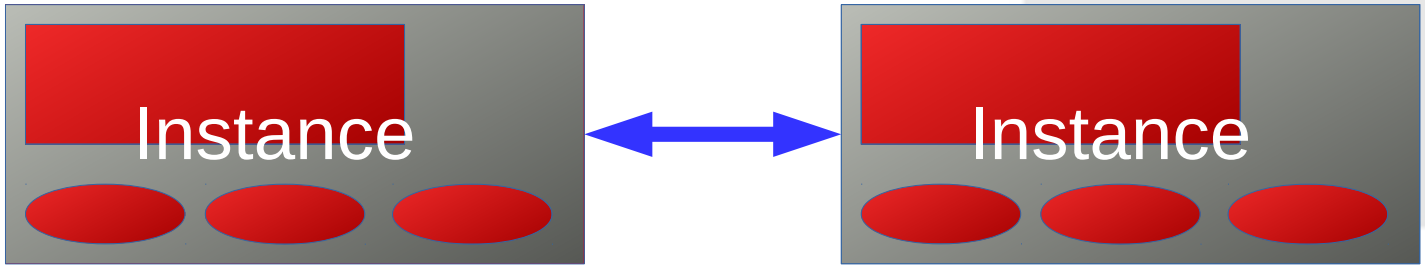
Clusterware

Oracle Clusterware

- alias OCW
  Grid Infrastructure (GI)
  Cluster Ready Services (crs)

- Clusterware, z.B. Failover von Services

- APIs und Infrastruktur für
  - Datenbank (CacheFusion, …)
  - ASM (FlexASM, …)
  - ACFS
  - ...



Dienste

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- OHASD - Oracle High Availability Service Deamon
  Starten und Überwachen der Clusterprozesse
  Schnittstelle zum Dienstemanagement des OS

- EVM (evmd) - Event Manager
  Ein- und ausgehende Benachrichtigungen zwischen Nodes und Diensten
  (denke: Message Bus)

Dienste

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- CSS (ocssd) - Cluster Synchronization Service
  Verwaltung Member Nodes / Erreichbarkeit
  Disk/Network Heartbeat
  Logging: ocssd.log / trc (12c)

- CRS (crsd) - Cluster Ready Service
  Steuern und Verwalten der „User“-seitigen Dienste (z.B. DB, Listener)
  Logging: crsd.log / trc (12c)
  - OraRootAgent - steuert privilegierte Dienste
  - OraAgent - steuert andere Dienste
    (Vorsicht: beide Namen auch beim OHASD)
  - Agent Logs liefern Applikations-Output

H.A.

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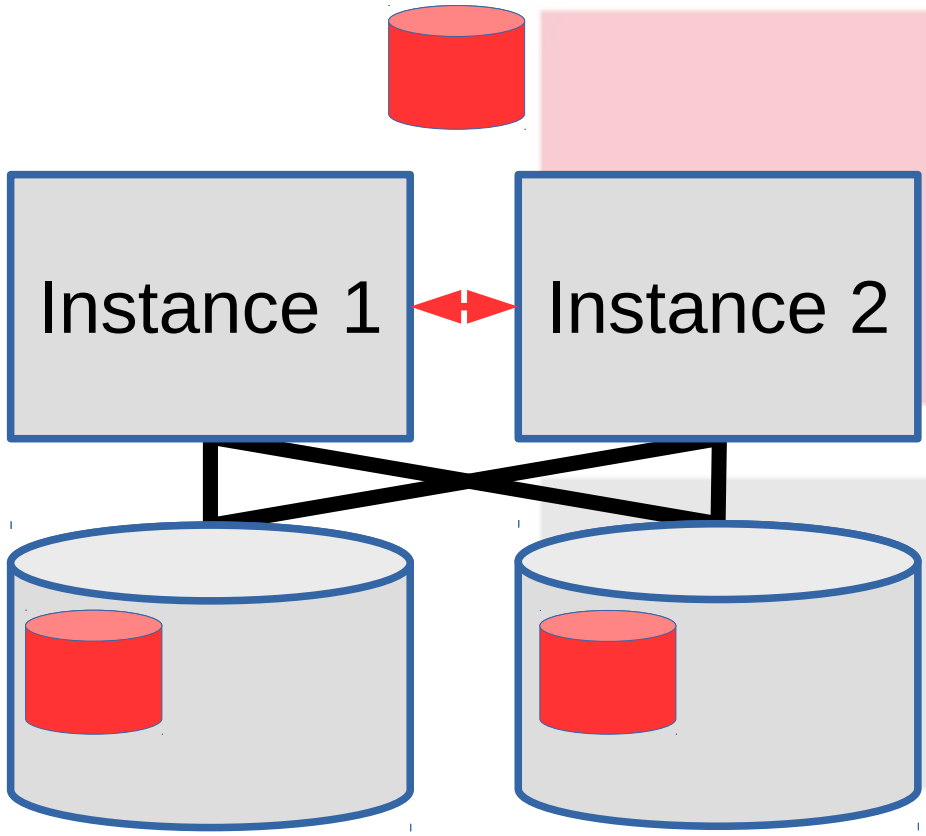
- Heartbeat Node Fencing
  - Bisher: Niedrigste Node-Nummer
  - 12.2: Niedrigste Anzahl Services oder Prio-Service

- Split-Brain-Problem
- Quorum: 1,3,5,7 …



Planung vs. Trouble

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- Infrastruktur zur Zeitsynchronisation LEBENSWICHTIG (Node Evictions)

- bevorzugt NTP (-x)
- Notfalls CTSS nicht als Observer
  => (Node mit Node)

- Interconnect
  - Latenz minimieren - jedoch mindestens Switched
  - Jumbo Frames
  - Multicast
  - Isolieren!

Cool & CLI

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- srvctl -h | grep xyz
  - Möglichst alles mit srvctl
  - UNBEDINGT aus GRID-Home starten! ($OH+$PATH)
  - Kein ADD für Diskgroup Services wird beim ersten Mount angelegt ;)
  - Volle Unterstützung für Dataguard (mit DG Broker)
- crsctl status resource -t
- crsctl -unsupported (z.B. entfernen DB Service ohne $OH)

OCW und SE*

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- Grid Infrastructure als Clusterware für Failover Cluster DB Failover ohne RAC One Node!
- Kein Linken von DB RAC Binaries
  => Standard Edition, SE1, SE2
  => 10-Tage-Regel möglich (1 Storage)
- Kein Linken von DB RAC Binaries
- 1-Node-Serverpools einrichten
- DB Service für Single Instance mit Server_pools=* anlegen (crsctl -unsupported, but works!)

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Non-RAC

Schon gewusst?

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- $TWO_TASK konkatiniert Inhalt mit @ an sqlplus
- Customized SQL prompt (glogin.sql) stört Utilities (dbca, asmca)
  z.B. *+SQL+>*
- ORACLE_HOME darf nicht mit / enden (hash Vergleich)
- DB_DOMAIN darf keinen Bindestrich enthalten (div. Probleme mit DB Links)

RMAN & Service

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- RMAN restore from service name (12c)

  RMAN> restore datafile 5 from service STANDBY;

- Funktioniert mit Datafiles, Control Files
- Leider NICHT mit Archived Redo Logs :(

Umgebung

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- Oracle: Unterschiedliche OS User nutzen
- Mein Tip: Vermeiden.
  Umgebungsskripte für installierte Produkte anlegen
- Vorschlag: /home/oracle/bin
- Setzen Umgebung UND Prompt
  z.B. [oracle@myhost ~] (MYSID) $
- Einbinden nach logon über source
  . db oder . grid


Heads in and not LOOKING OUT...
ETPS
"I say, that's a jolly interesting reading"
SPARKY
BONES
...can seriously damage your health
Maintain constant LOOK-OUT at all times
However interesting the data may be!
Defence Aviation Safety Centre Poster No 200513

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Q & A

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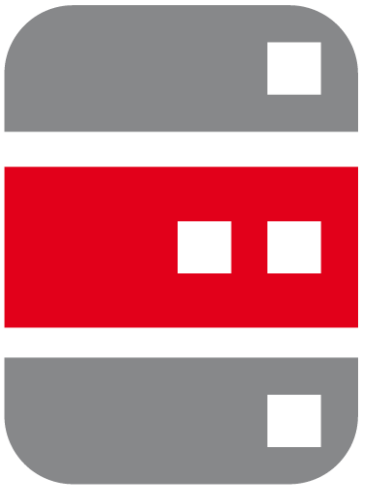

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