

Oracle Grid Infrastructure

Concepts and Fancy Features

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ORACLE®

Certified Professional

Oracle Database 12c
Administrator

ORACLE®

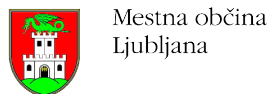
Certified Professional

Java SE 8 Programmer

Abakus Plus d.o.o.

- Infrastructure Team
 - Services
 - OS & NET admin
 - DBA, Programming
 - Applications
 - Deja Vu
 - APPM
 - Arbiter
- Development Team
 - Enterprise Applications
 - Document Management
 - Newspaper Distribution
 - Flight Information System

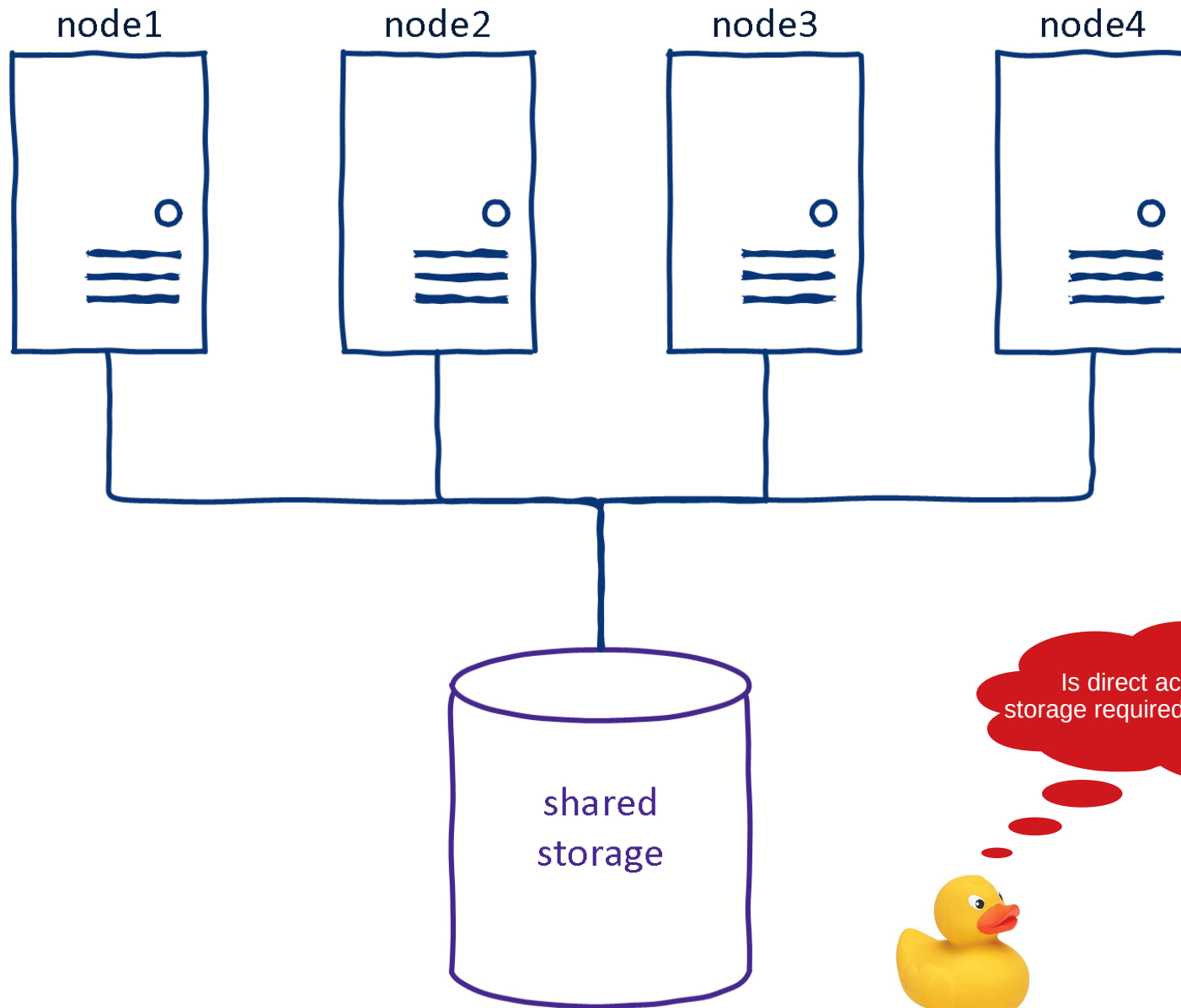
References



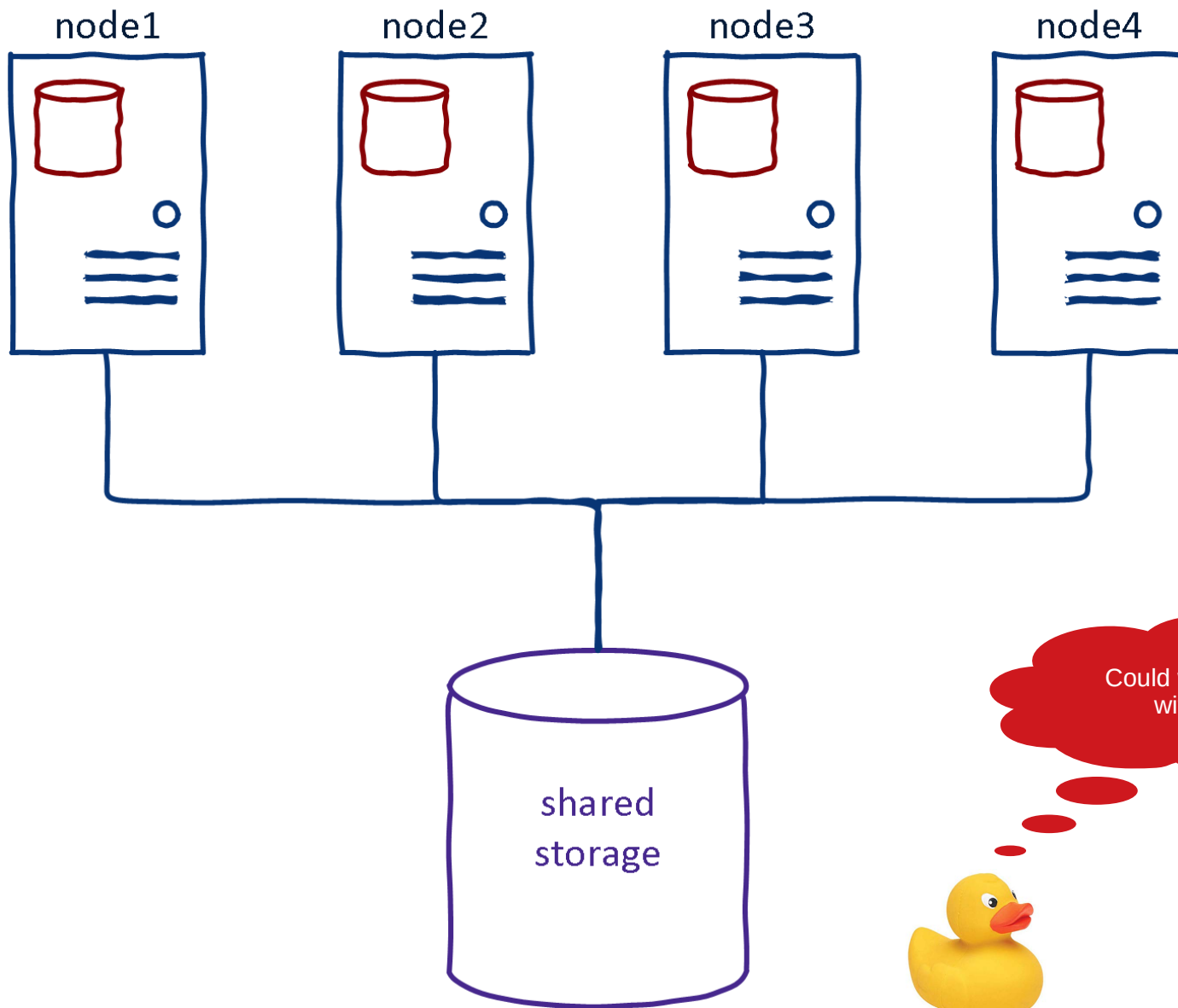
Oracle Grid Infrastructure

- **Oracle Clusterware**
... enables servers to communicate with each other, so that they appear to function as a collective unit.
- **Oracle ASM**
Oracle Automatic Storage Management

Oracle Grid Infrastructure



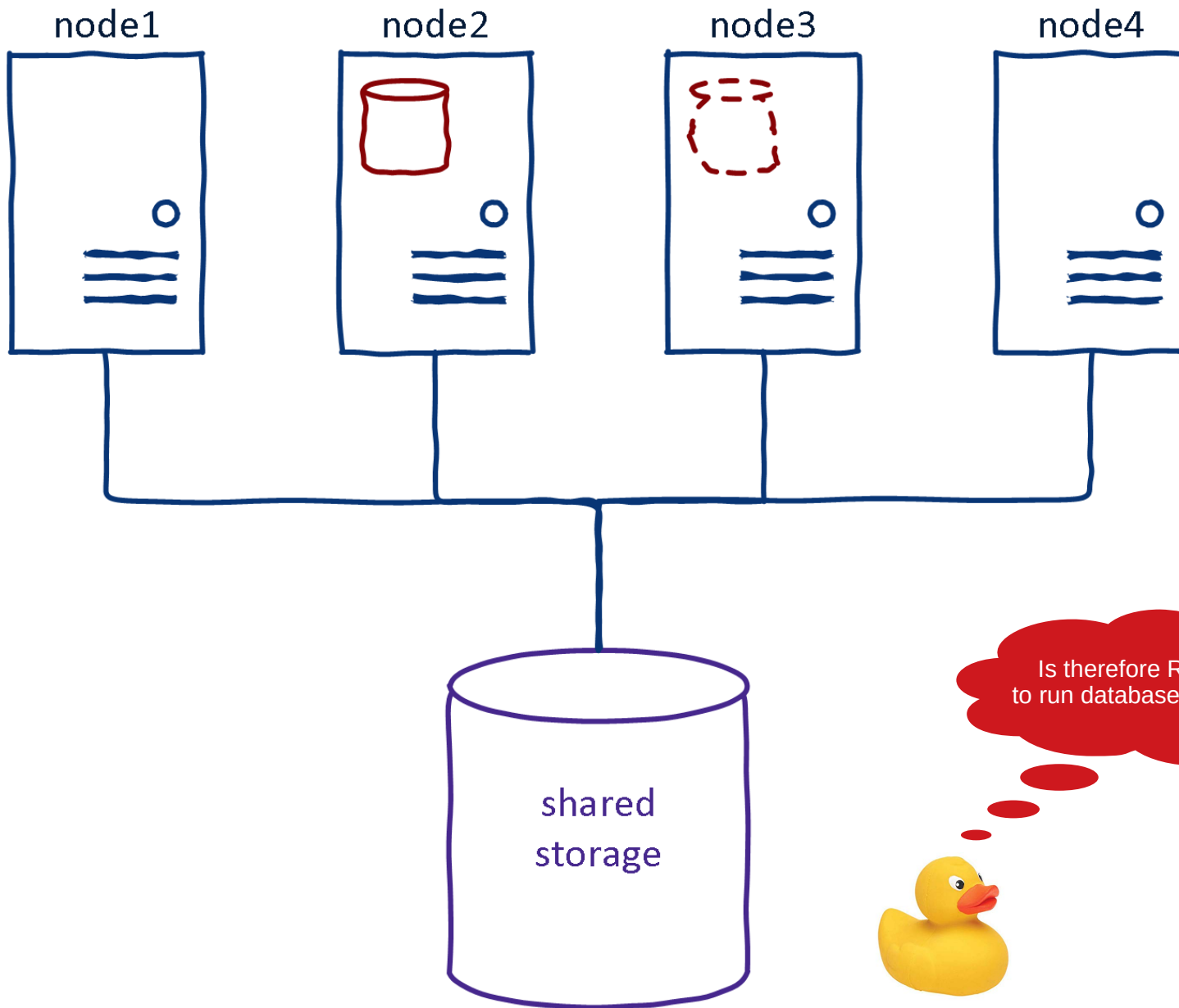
Real Application Cluster



Could we have RAC without GI?



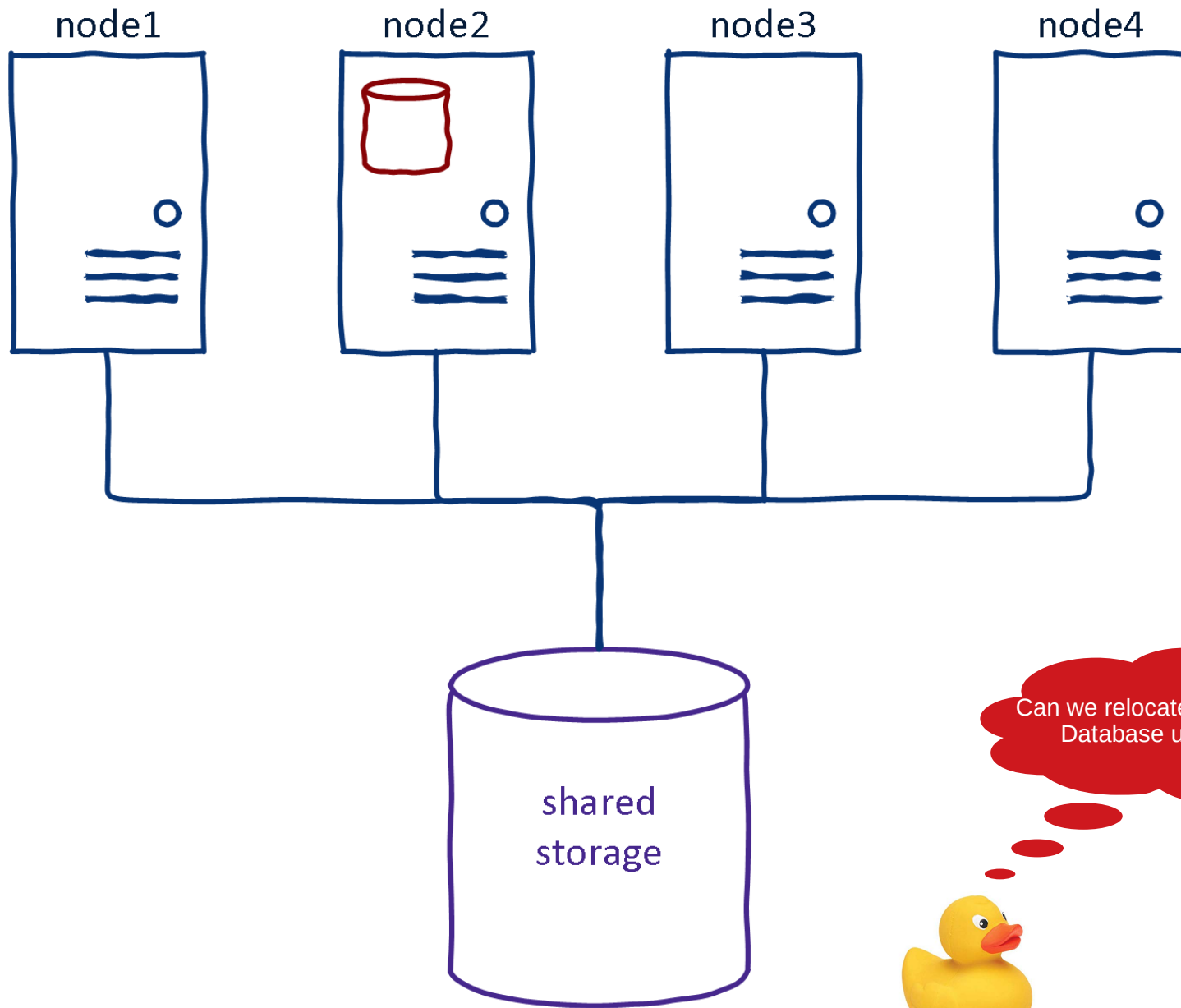
RAC One One



Is therefore RAC required to run databases on top of GI?



Single Instance High Availability

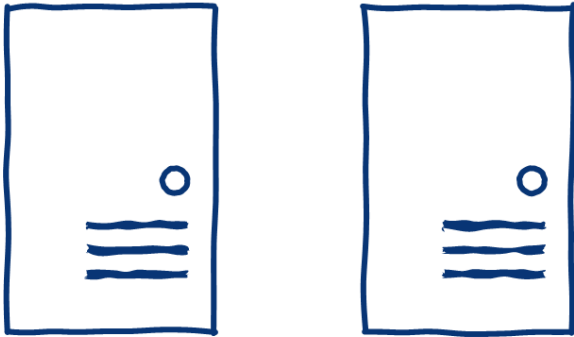


Can we relocate »single instance« Database using »srvctl« ?

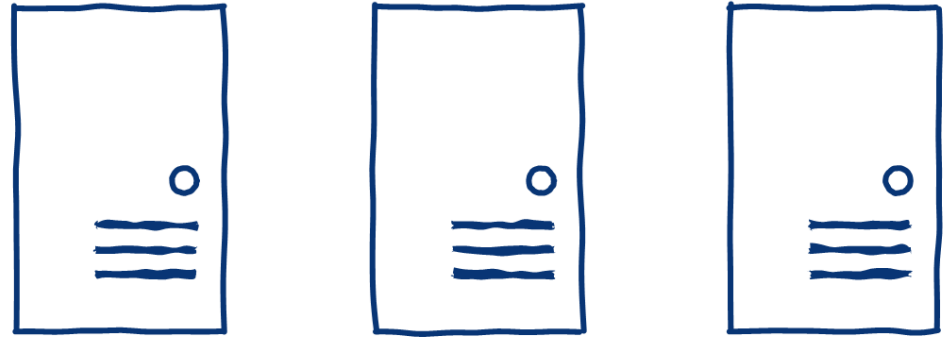


Cluster Domain

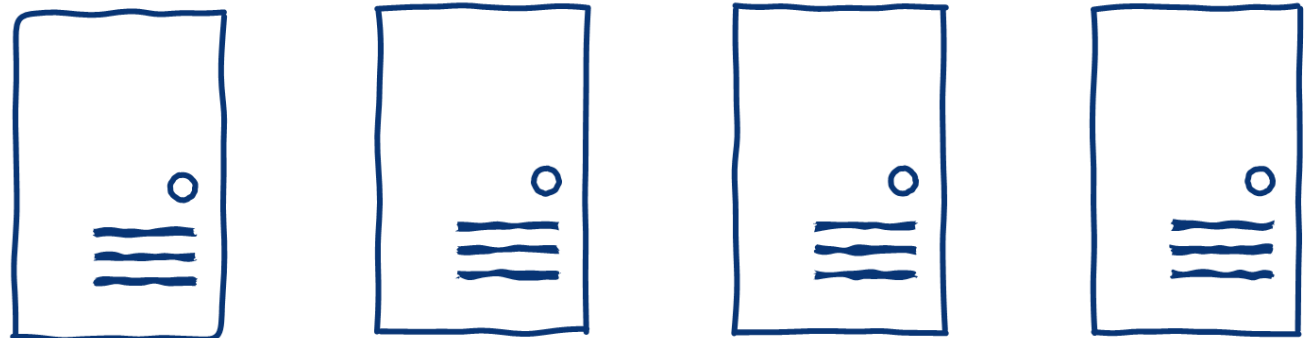
Domain Services Cluster



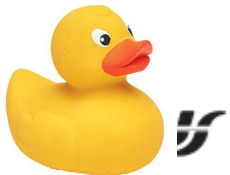
Database Member Cluster



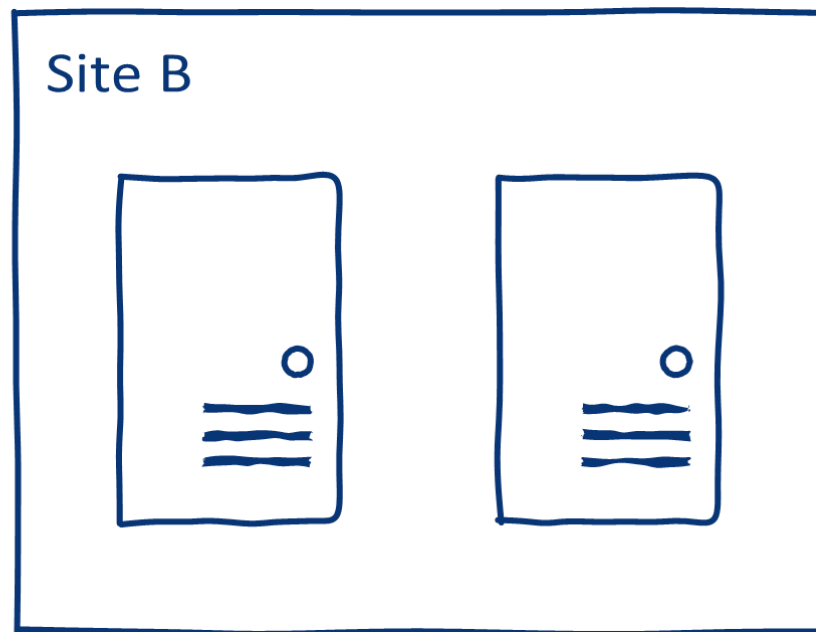
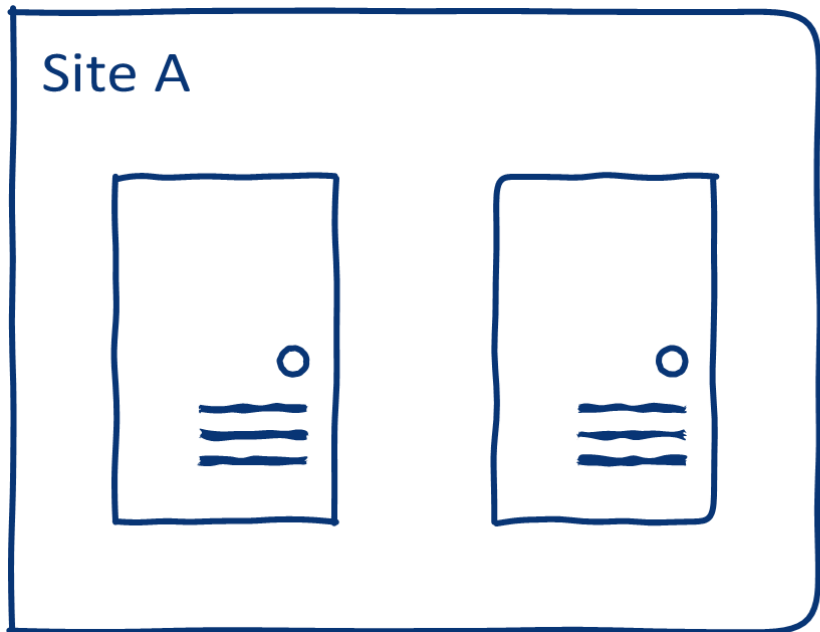
Application Member Cluster



Minimum number of nodes?



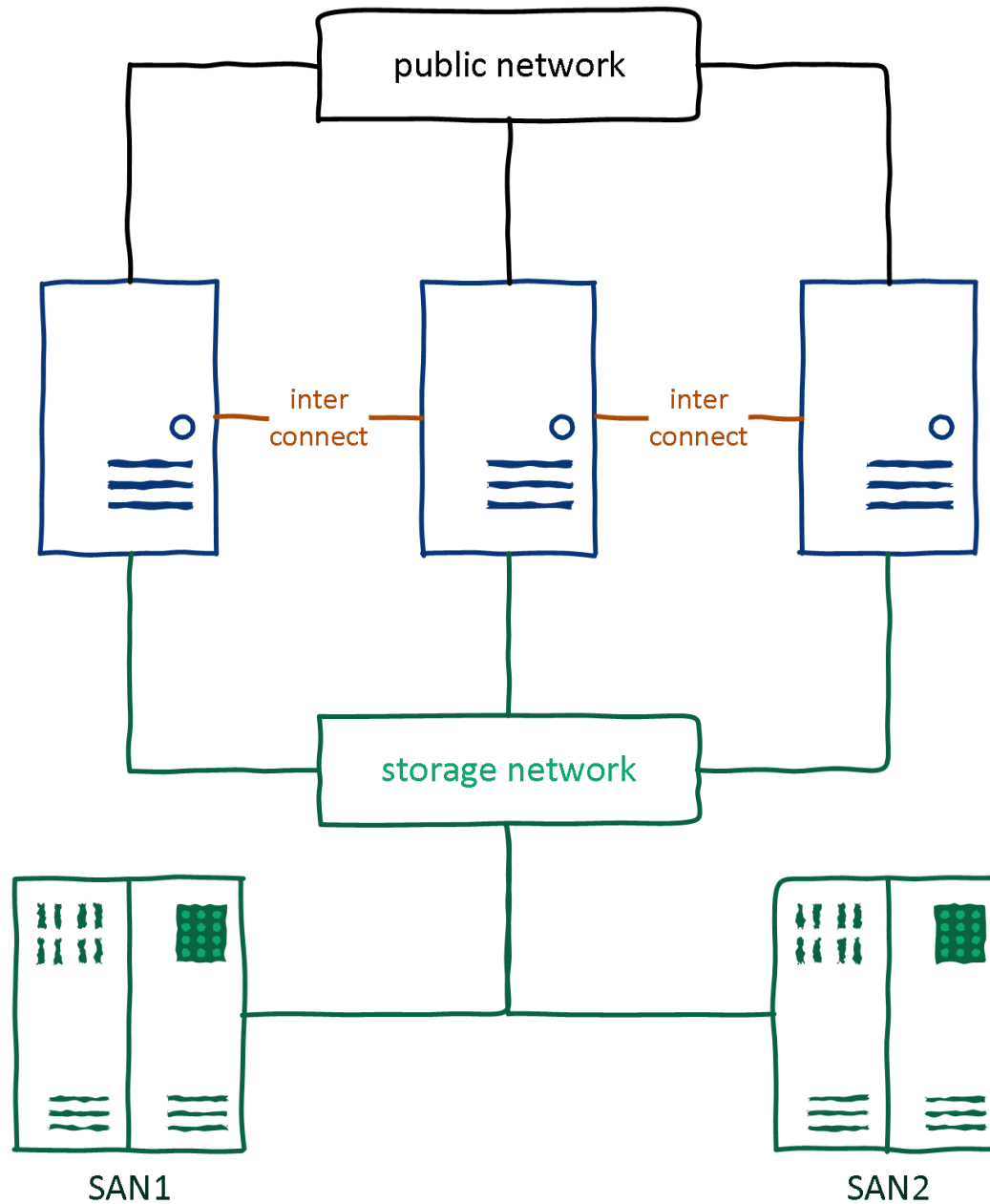
Extended Cluster



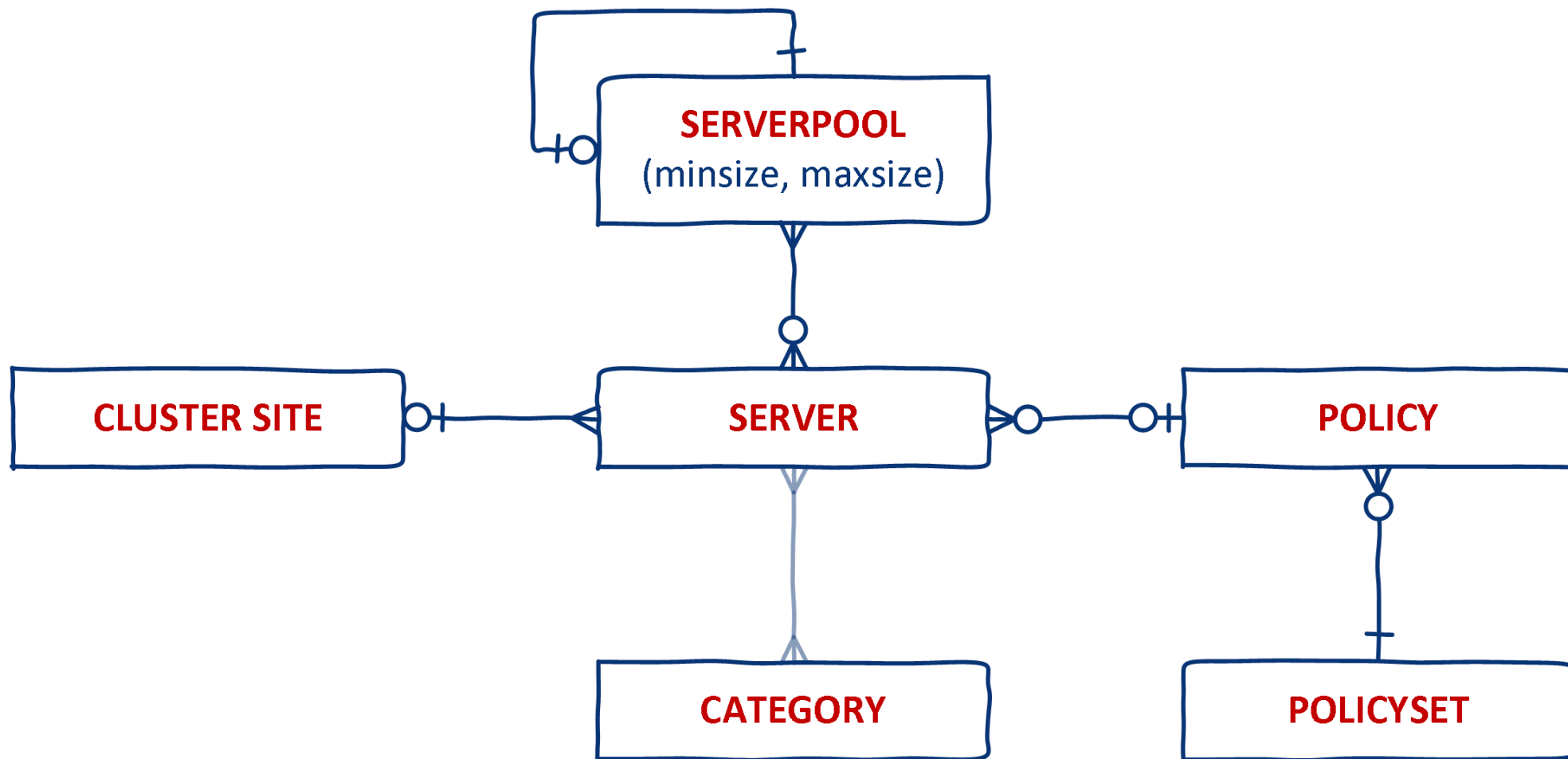
»read« performance implications?
What about »write« performance?



Network Considerations



Policy Based Clusters



Database Licensing

- Desupport of Oracle Real Application Clusters (RAC) with Oracle Database Standard Edition 19c (Doc ID 2504078.1)
- Standard Edition 2 has a maximum of
 - 2 sockets
 - 16 CPU threads per instance
- Standard Edition had maximum of
 - 4 sockets
 - Unlimited CPU threads.

Clusterware Licensing

<https://www.oracle.com/technetwork/database/database-technologies/clusterware/overview/clusterware-for-linux-088663.html#13>

As an Oracle Linux Support customer, how do I obtain Oracle Clusterware?

Oracle Linux Support customers at the Basic and Premier levels can [download the product](#) and deploy it for free as part of their Oracle Linux Support contract.

<https://docs.oracle.com/en/database/oracle/oracle-database/19/dblic/Licensing-Information.html#GUID-75262092-CD86-4B30-A21B-92ECC1C2E130>

Oracle Clusterware provides cluster membership and high availability monitoring and failover. Oracle Clusterware may be used to protect any application (restarting or failing over the application in the event of a failure) on any server, free of charge. Oracle will provide support for Clusterware only if the server is running an Oracle product, which may include Oracle Linux or Oracle Solaris, that is also under Oracle support.

Oracle RAC on Oracle VM

- It is supported, but it only makes sense when VM technology is used for hardware partitioning:
 - When your HW has more CPUs than licensing allows
 - When you want to use the same hardware for something else (other VMs)
- Clusterware generally provides faster recovery than OVM because it does so by relocating specific services rather than complete VM.

root.sh is restartable!

- `rootupgrade.sh` and `root.sh` are restartable
- Both use »checkpoint« file to mark the completed steps:
 - `$ORACLE_BASE/crsdata/grid1/crsconfig/ckptGridHA_grid1.xml`
 - `$ORACLE_BASE/crsdata/@global/crsconfig/ckptGridHA_global.xml`
- Log messages are detailed to exact command in `$ORACLE_BASE/crsdata/grid1/crsconfig/rootcrs_<hostname>_<date>.log`

```
2019-09-21 19:22:40: Invoking "/oracle/grid/19.4.0/gihome_1/bin/cluutil -ckpt -global -oraclebase /oradmin/grid -chkckpt -name ROOTCRS_FIRSTNODE -status"
```

```
2019-09-21 19:22:40: trace file=/oradmin/grid/crsdata/grid1/crsconfig/cluutil8.log
```

```
2019-09-21 19:22:40: Running as user grid: /oracle/grid/19.4.0/gihome_1/bin/cluutil -ckpt -global -oraclebase /oradmin/grid -chkckpt -name ROOTCRS_FIRSTNODE -status
```


Cluster Verification Utility

```
$ cluvfy stage -post crsinst \  
                -allnodes -verbose
```

...

Verifying OCR Integrity ...WARNING

PRVG-6017 : OCR backup is located in the same
disk group "+VOTE" as OCR.

...

Clusterware Agent API

- Use shell script (aka »actionscript«) to protect your resource (scriptagent) or
- Write your own agent in C/C++ using Agent Framework

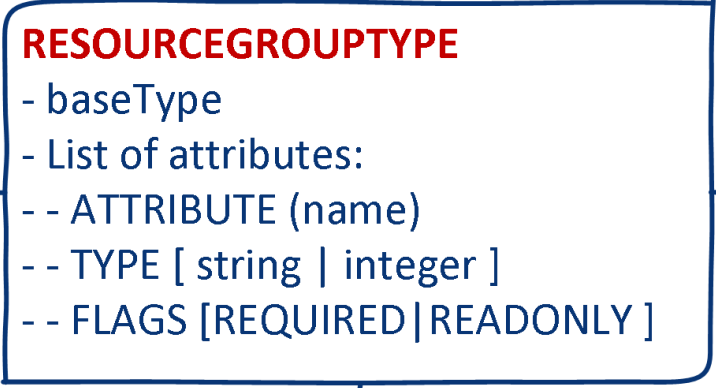
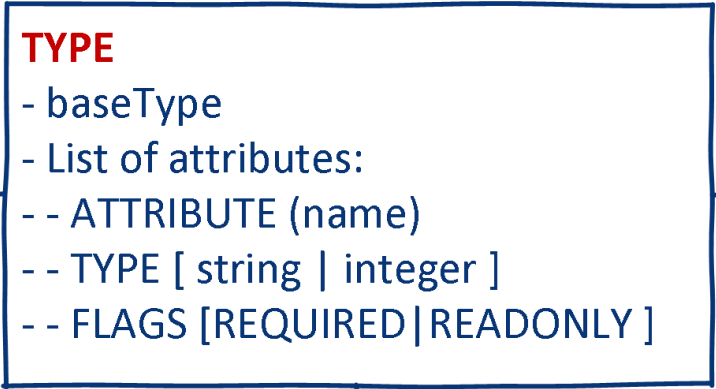
Table H-2 Entry Point Types

Name	Description	Type Code
START	Start a resource and bring it online	CLSAGFW_ACTION_START
STOP	Stop a resource and take it offline	CLSAGFW_ACTION_STOP
CLEAN	Clean up after a failed command on the resource	CLSAGFW_ACTION_CLEAN
CHECK	Check the state of the resource	CLSAGFW_ACTION_CHECK
ABORT	End an executing command that has timed out	CLSAGFW_ACTION_ABORT
DELETE	Resource is about to be deleted	CLSAGFW_ACTION_RES_DELETED
MODIFY	Resource is modified	CLSAGFW_RESATTR_MODIFIED
ACTION	Invoke custom action on the resource	CLSAGFW_RES_ACTION

Database Standard Edition?

- Manually install/clone software to all nodes
- `srvctl remove database`
- Write your own action script
- Make sure you can manually start the database on any node using your actionscript (spfile, sudoers, oratab, audit_file_dest ...)
- `crsctl add resource`

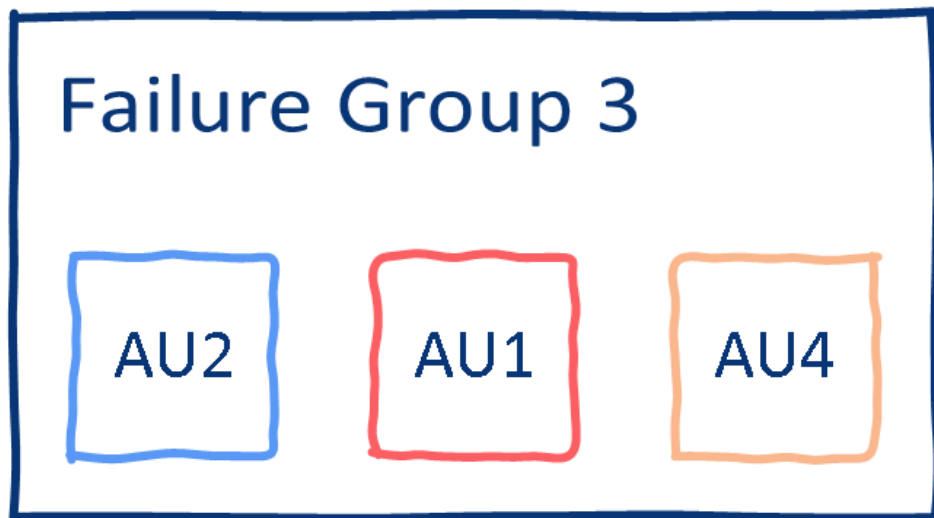
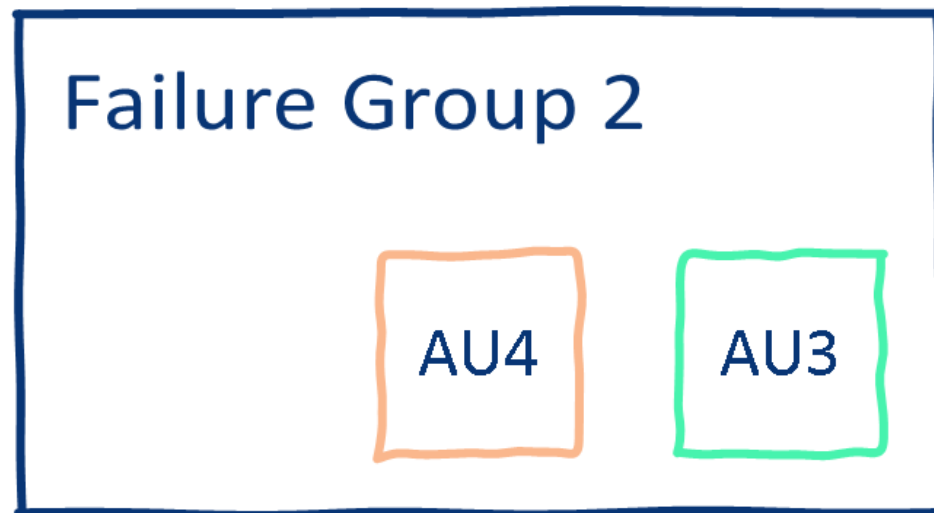
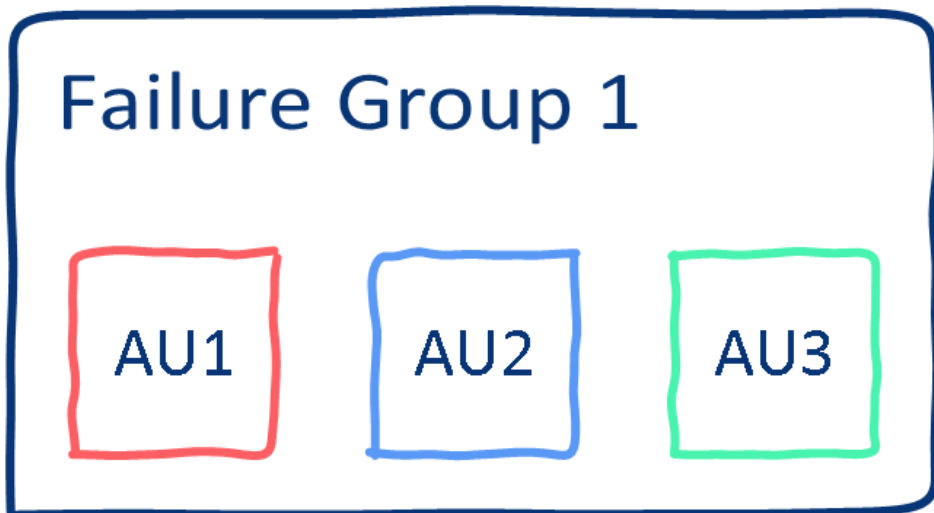
Clusterware Resources



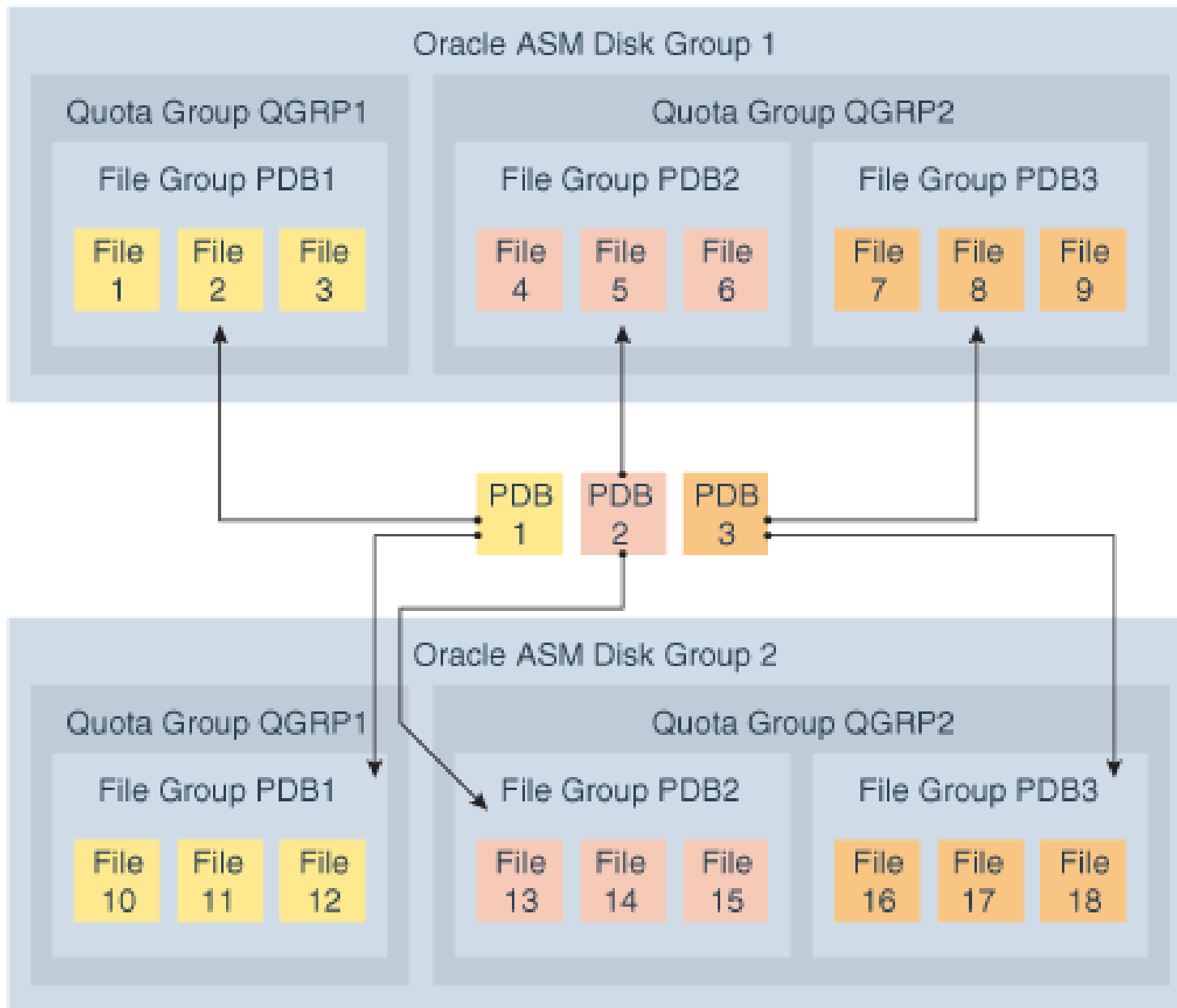
Resource Dependencies

- START_DEPENDENCIES
 - hard
 - weak
 - attraction
 - dispersion
 - exclusion
 - pullup
- STOP_DEPENDENCIES
 - hard
 - (Some) other options
 - global
 - res. type or resource

ASM Normal Redundancy



ASM Flex Redundancy





<http://www.abakus.si/>

