

# Oracle Storage Options

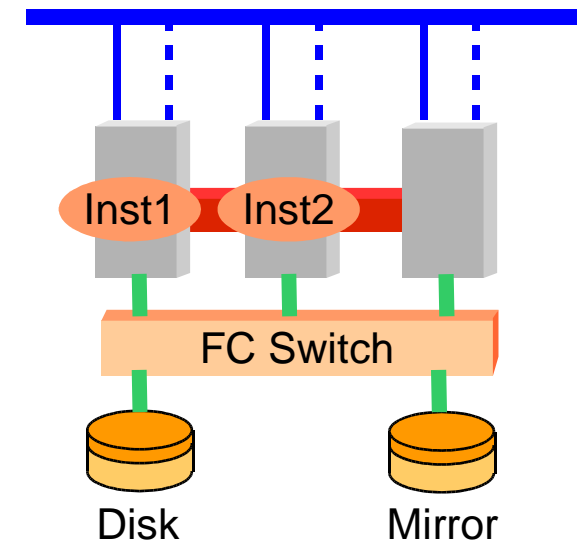
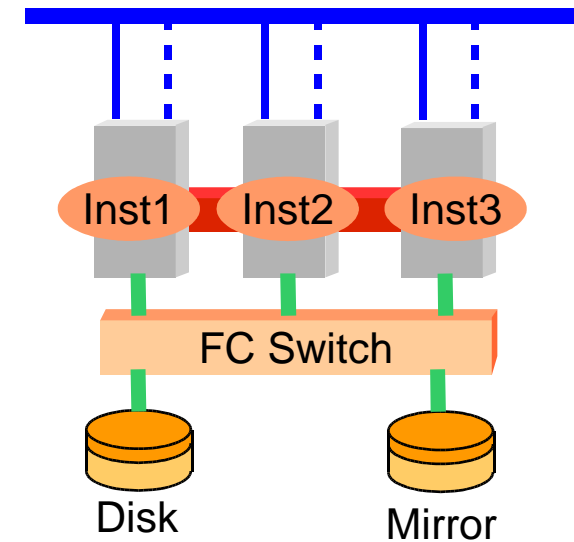
**RAW, ASM, CFS, NFS for  
Real Application Cluster**

**Unterführung, 11.2005  
M. Kühn**

- **Be spoilt for choice ?**
    - RAC Review
    - Introduction Storage Options
  - **RAW**
    - In short
  - **ASM**
    - Automatic Storage Management
  - **CFS Options**
    - OCFS[2], QFS, GxFS, ..
  - **NFS**
    - Certified NAS Storage
- Konfiguration**
- „best Practice“

## Be spoilt for Choice: RAC Review

- Physical Structure:
  - Two or more nodes
  - Interconnect
  - DB Files on shared storage
  - Public network (VIP)
- Software:
  - clusterware
    - Vendor and/or CRS
  - database
  - shared storage management:
    - RAID
    - VM (Volume Manager)



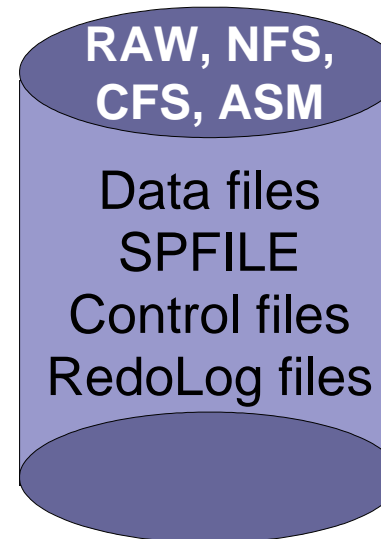
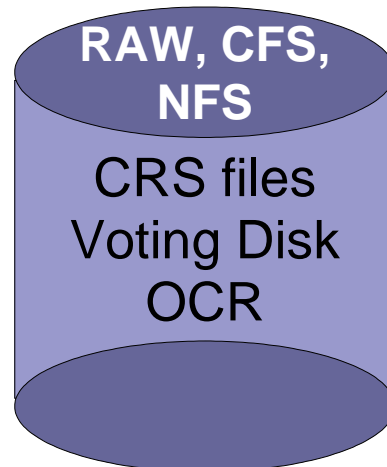
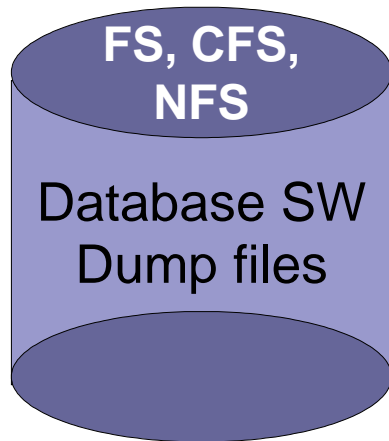
**Be spoilt for choice: Introduction**

<b>Abbrev.</b>	<b>Storage option</b>
Raw	Raw devices, no file system
ASM	Automatic Storage Management
CFS	Vendor Cluster file system
OCFS	Oracle Cluster file system
NFS	Network file system (certified NAS device)

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## Be spoilt for choice: Introduction

### Types of database files



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## Be spoilt for Choice: Introduction

- Not all files have to be on a shared storage subsystem
- Each node can have its own ORACLE\_HOME
- All data files and CRS files must be on shared storage
- Flash Recovery Area must be shared by all instances
- No platform is supported for all storage options

## Be spoilt for choice: [Introduction](#)

### Platforms and file types support

Storage option	Platforms	Supported file types	NOT supported file types
Raw	All platforms	Data files, CRS	SW, Dump, Recovery
ASM	All platforms	Data files Recovery	CRS, SW, Dump
Certified CFS	AIX GPFS, True64 CFS, RedHat GFS, Solaris QFS	All	None
OCFS	Linux, Windows	Data files, CRS, Recovery	SW, Dump
OCFS2	Linux	All beta, not certified	None
NFS	Linux, Solaris	All	None

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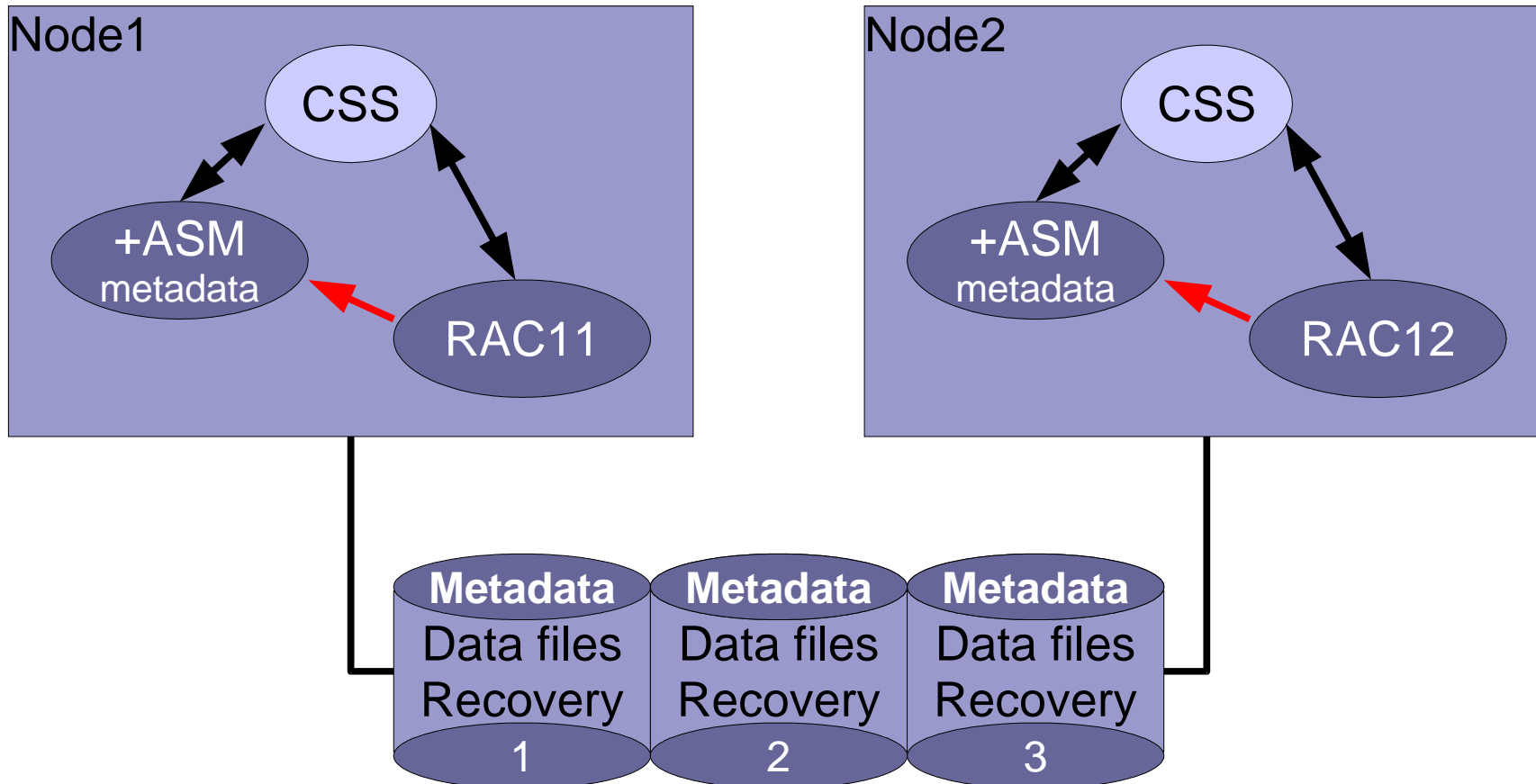
## Raw devices: in short

- **Advantage:**
  - Fast Performance
  - All platforms
- **Disadvantage:**
  - Manageability
    - Resize tablespaces
    - full recovery
  - Flash Recovery Area
  - Auto extend or Oracle managed files

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## ASM: Automatic Storage Management

### ASM Concept



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## ASM: Automatic Storage Management

- ASM „like“ logical volume manager
- Configured via SQL
- ASM instance has no data files
- Reads metadata config from disks

```
oracle@zone1> export ORACLE_SID=+ASM
oracle@zone1> sqlplus /nolog
SQL> connect / as sysdba
SQL> connected.
SQL> create diskgroup myDG normal redundancy
      2 failgroup myGRP1 disk
      3 '/dev/rdisk/c3t0d0s0',
      4 '/dev/rdisk/c3t0d1s0',
      5 '/dev/rdisk/c3t0d2s0'
      6 failgroup myGRP2 disk
      7 '/dev/rdisk/c4t0d0s0',
      8 '/dev/rdisk/c4t0d1s0',
      9 '/dev/rdisk/c4t0d2s0';
```

## ASM: Automatic Storage Mangement

- Command line utility in Oracle 10g R2

```
oracle@zone1> export ORACLE_SID=+ASM
oracle@zone1> asmcmd
ASMCMD> ?
      commands:
      -----
      cd
      du
      find
      help
      ls
      lsct
      lsdg
      mkalias
      mkdir
      pwd
      rm
      rmalias
```

## ASM: Automatic Storage Mangement

```

ASMCMD> lsct
DB_Name      Status      Software_Version  Compatible_version  Instance_Name
+ASM         CONNECTED   10.2.0.1.0       10.2.0.0.0         +ASM
peter        CONNECTED   10.2.0.1.0       10.2.0.1.0         peter
ASMCMD> cd /MyDG/PETER/
ASMCMD> ls
CONTROLFILE/
DATAFILE/
ONLINELOG/
PARAMETERFILE/
TEMPFILE/
spfilepeter.ora
ASMCMD> cd DATAFILE
SMCMD> ls -l
Type          Redund  Striped  Time                Sys  Name
DATAFILE     MIRROR  COARSE  NOV 17 12:00:00      Y    EXAMPLE.269.574531725
DATAFILE     MIRROR  COARSE  NOV 17 12:00:00      Y    SYSAUX.257.574531325
DATAFILE     MIRROR  COARSE  NOV 17 12:00:00      Y    SYSTEM.256.574531323
DATAFILE     MIRROR  COARSE  NOV 17 12:00:00      Y    UNDOTBS1.258.574531327
DATAFILE     MIRROR  COARSE  NOV 17 12:00:00      Y    USERS.259.574531327
ASMCMD> du
Used_MB      Mirror_used_MB
      864              1732
ASMCMD> exit

```

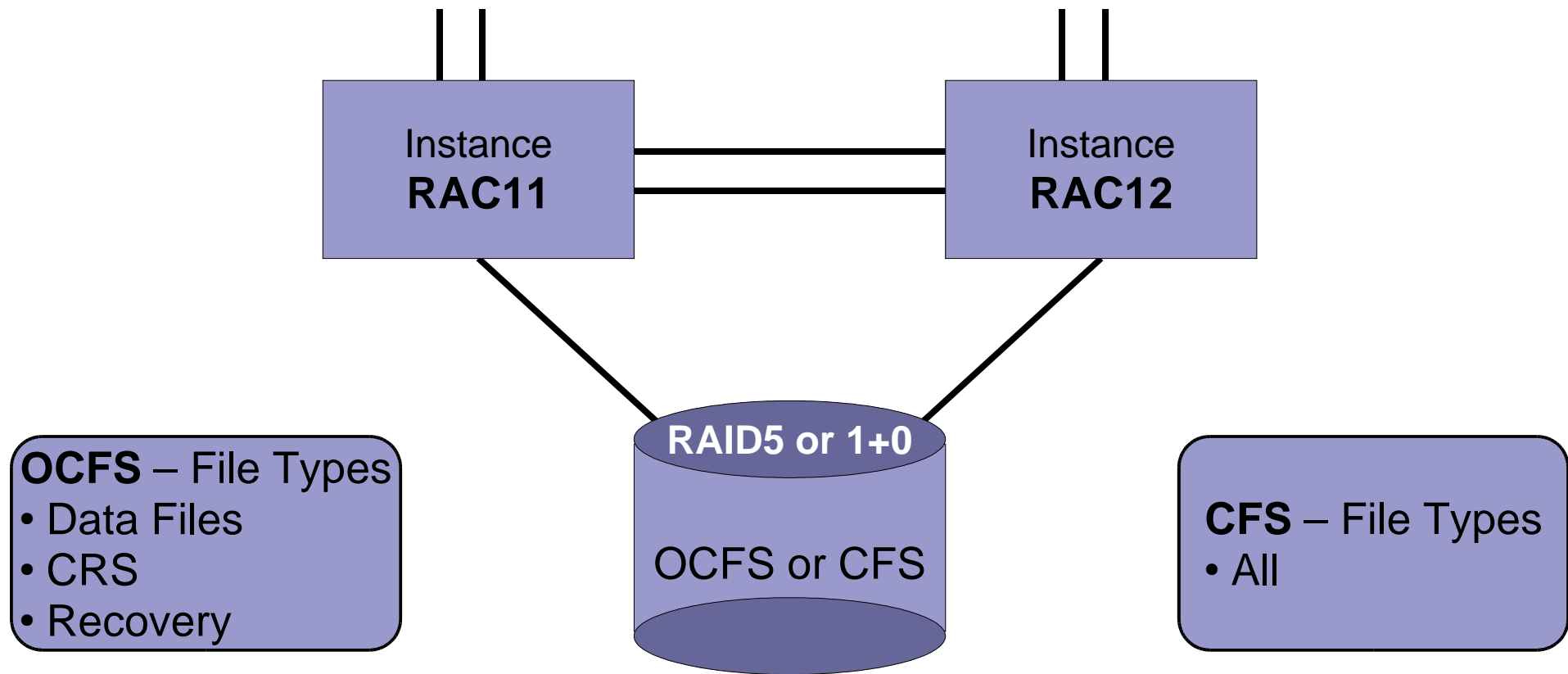
## ASM: Automatic Storage Management

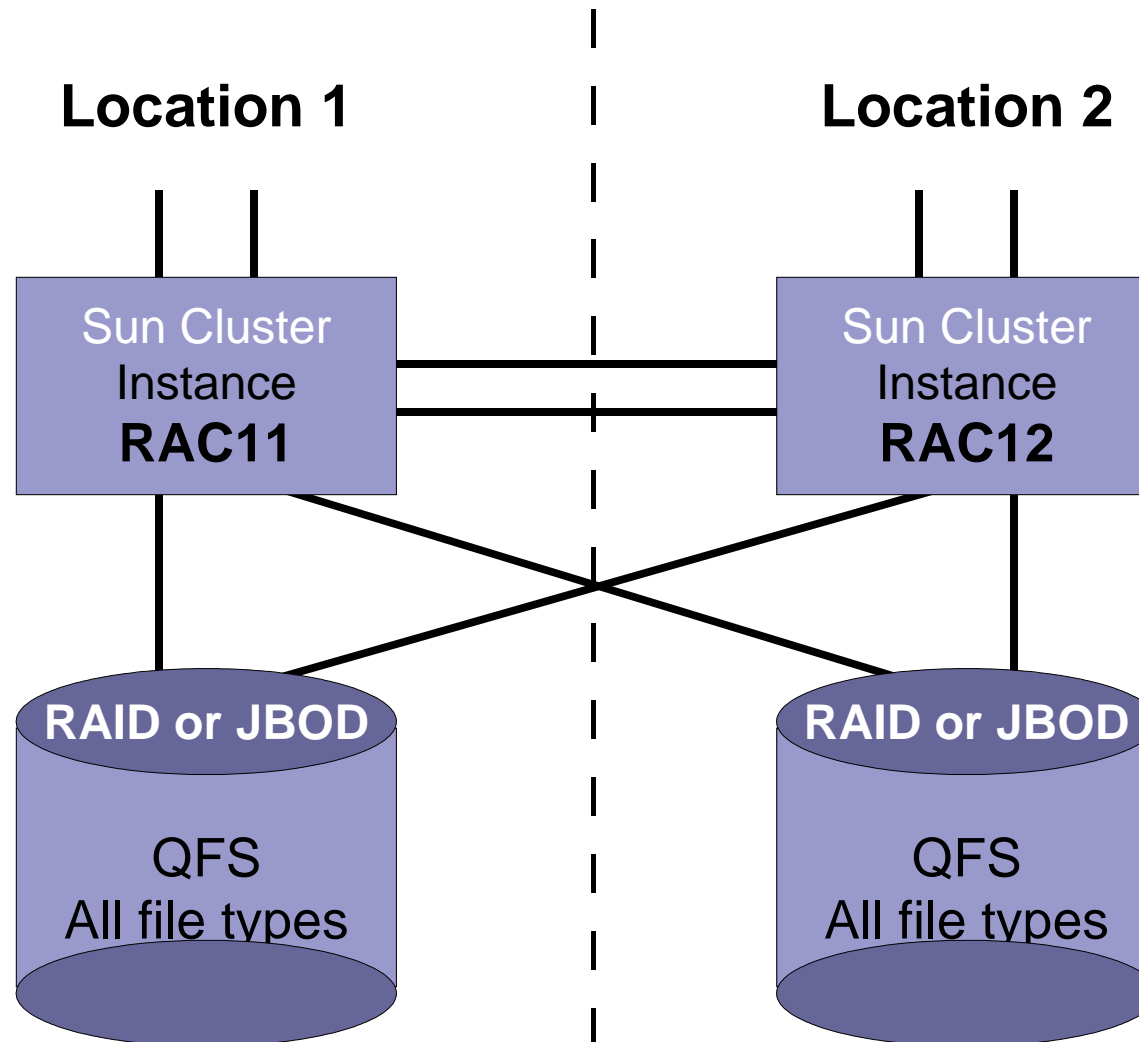
- Advantage:
  - Benefits of LVM
  - Ease of management of raw devices
  - Automatic I/O tuning for all type of workloads
  - RAW disk I/O performance
  - Online storage migration
- Disadvantage
  - ASM files only be managed through oracle sql
    - No use of unix file system tools (cp, ls, ..)
    - No use of third-party backup software
  - No CRS files
  - ASM instance dependency

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## **CFS:** OCFS, QFS, GPFS, GFS

- OCFS – Oracle Cluster File System (OCFS2 beta, not certified)
- QFS – Sun Quick File System
- GPFS – IBM Global Public File System
- GFS – RedHat Global File System

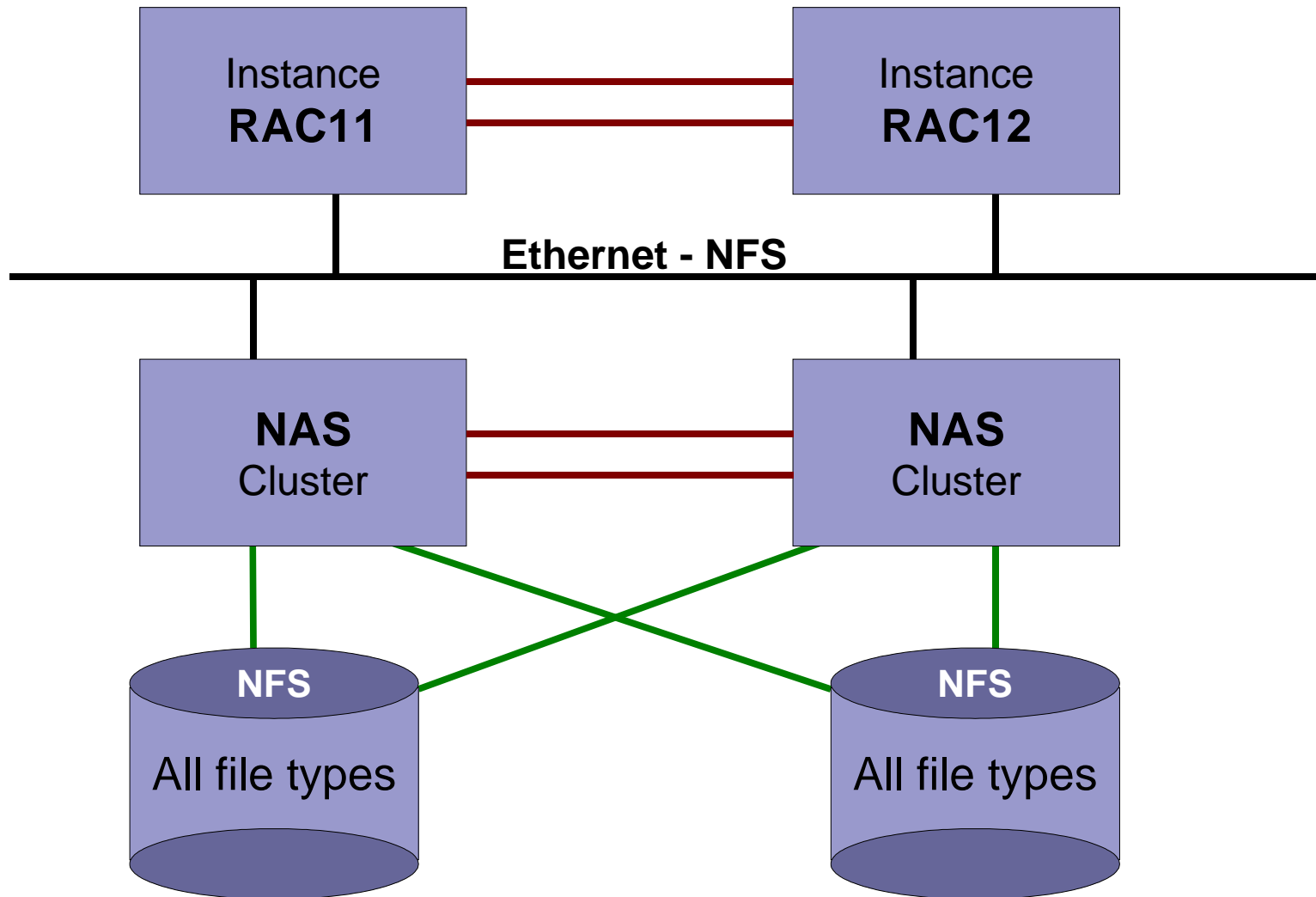
**CFS: OCFS, QFS, GPFS, GFS****One location**

**CFS: OCFS, QFS, GPFS, GFS**

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## NFS: Certified NAS Storage

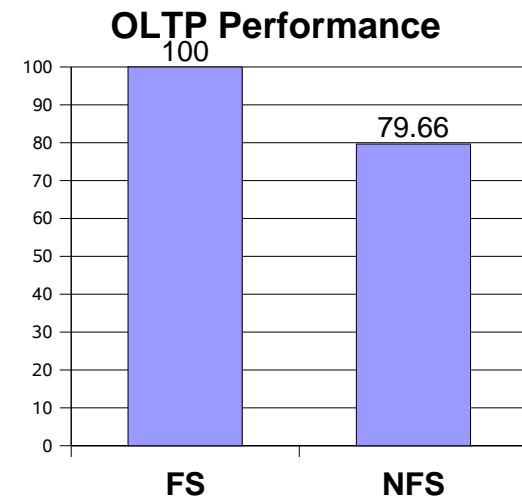
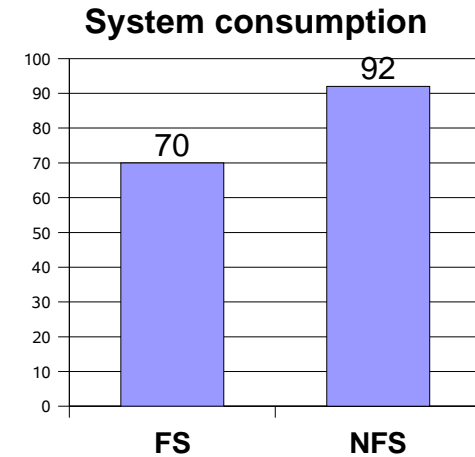


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## NFS: Certified NAS Storage

- **Advantage:**
  - Ease of use
  - all file types
  - Relatively low cost (if no NAS cluster)
  
- **Disadvantage:**
  - Performance
    - Need more CPU Resource ca. +20%
    - OLTP workload ca. 20-30% slower
  - Only for Linux and Solaris

Solaris 10 new TCP/IP Stack and NFSv4 compensate the disadvantages sparsely.

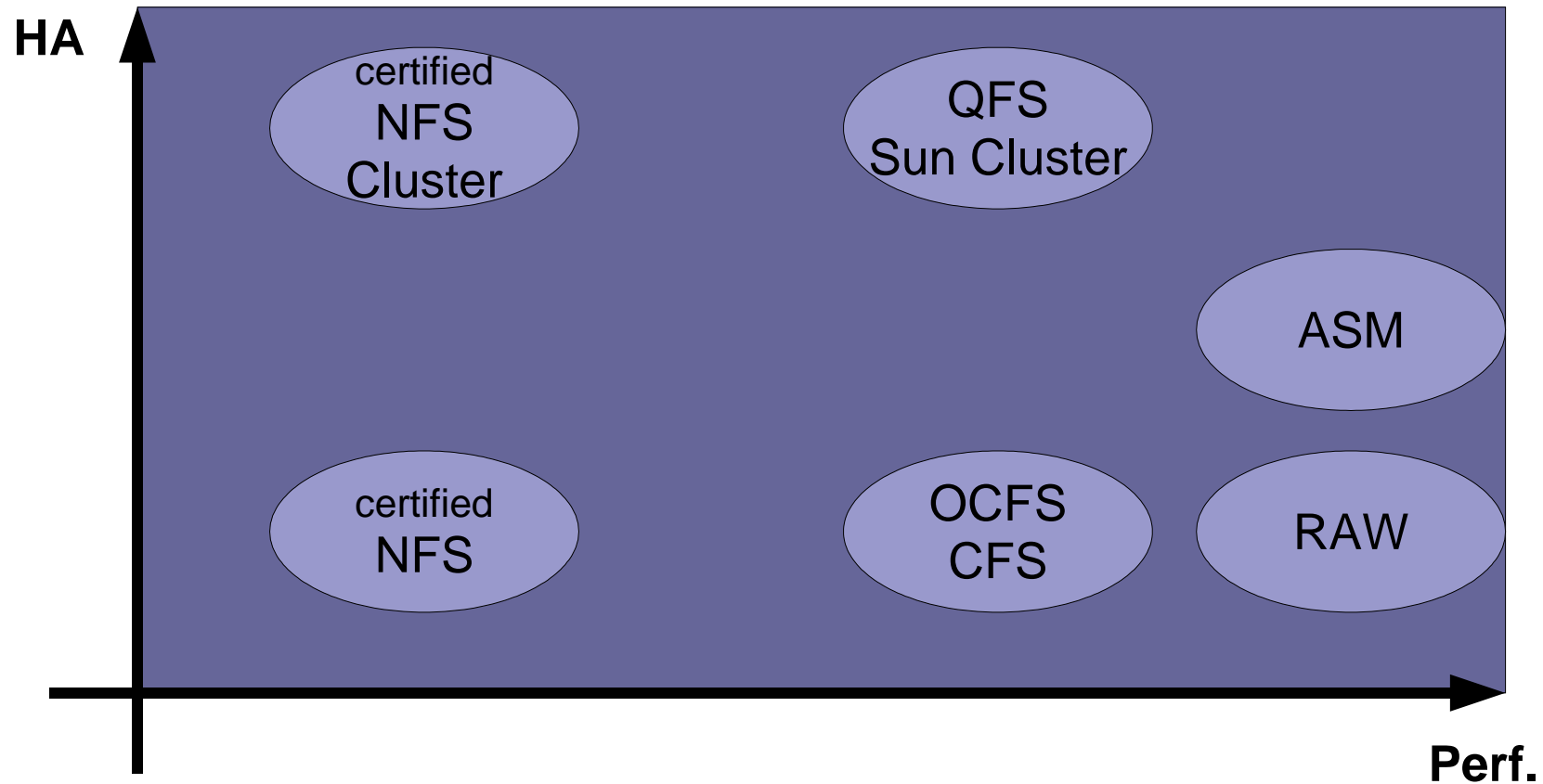


## **NFS:** Certified NAS Storage

- Vendor List:
  - RAC certified:
    - EMC: Celerra
    - Netapp: Filer
    - Sun: NAS 5x10
  - Non RAC
    - Auspex: NS3000XR
    - BlueArc: Titan Silicon Server
    - HP: ProLiant Storage Server
    - NEC: Storage NV Series
    - Pillar Data Systems: Axiom 500
    - Procom Technology: NetFORCE
    - Veritas: ServPoint

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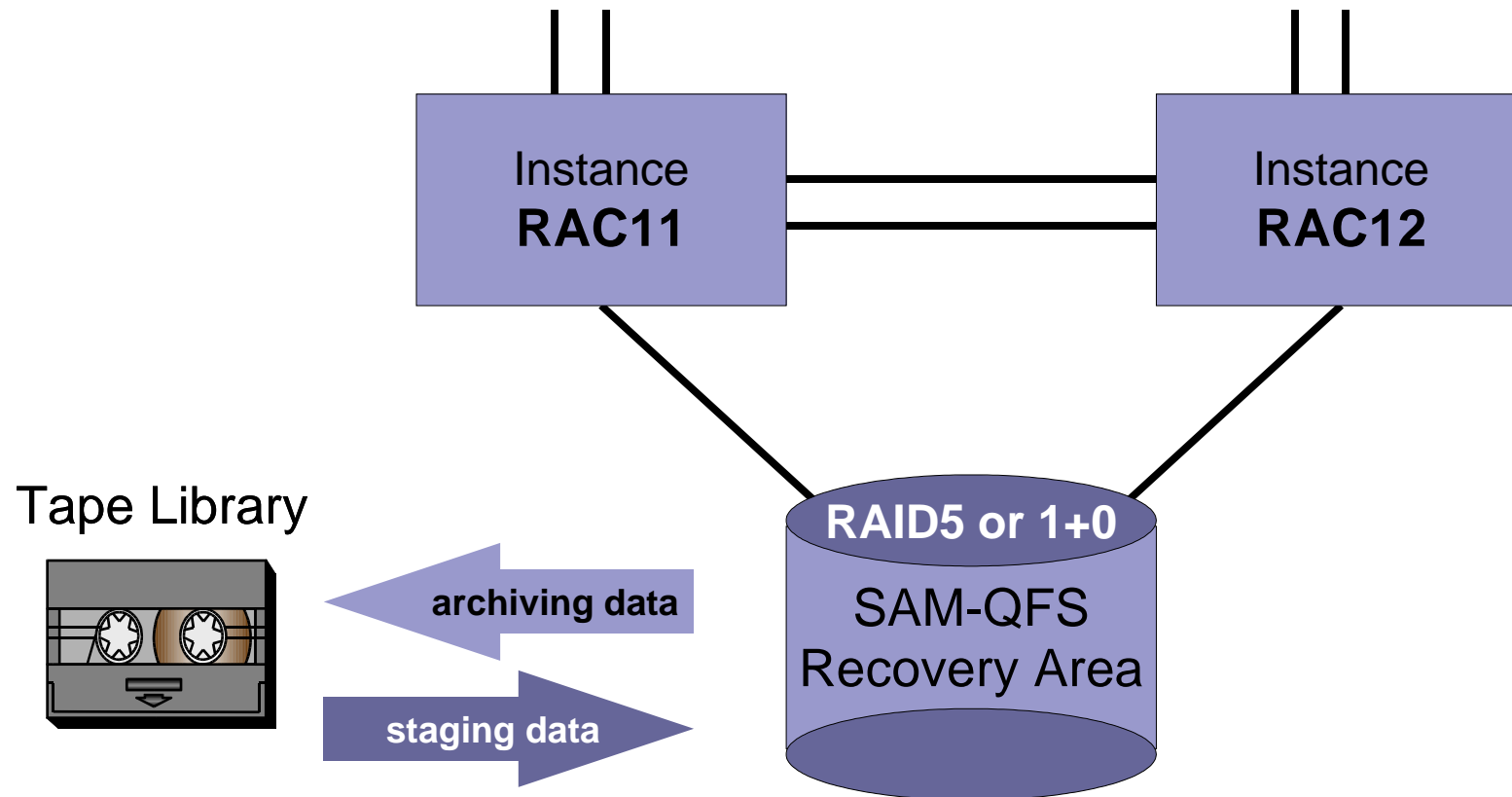
## Best practice: Overview



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## Best practice: Flash Recovery Area with SAM-QFS

- Automatic storage archiving of Oracle Flash Recovery Area



## Questions ?

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