ORACLE

Oracle Automatic Storage Management (ASM)

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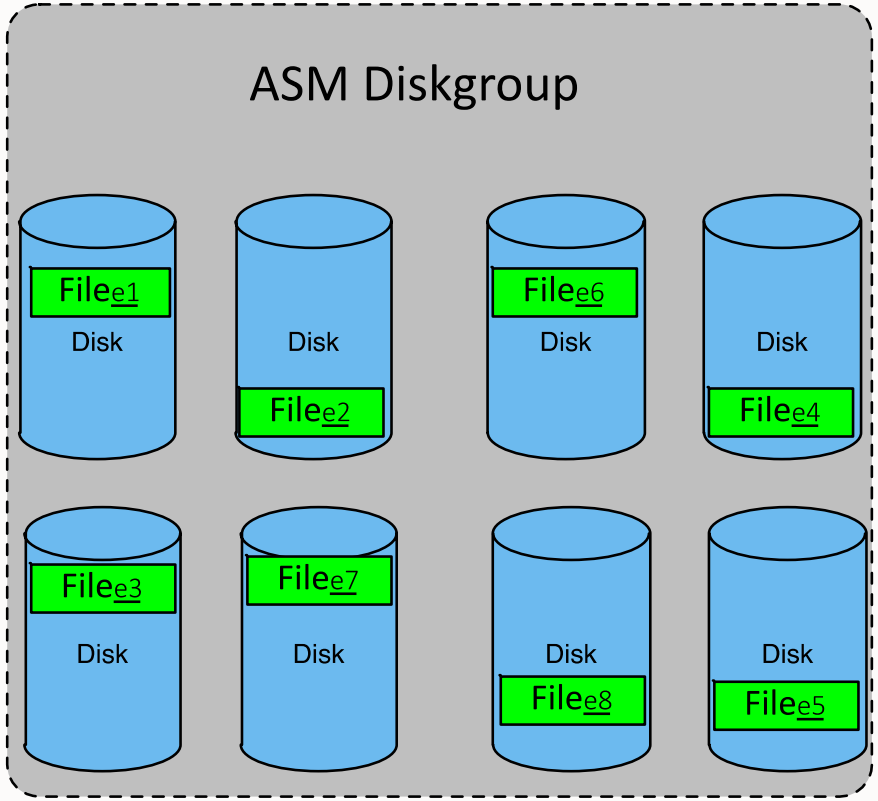
ASM History 101

The **Simple** Idea for addressing the complexity of storage management

Provide an integrated cluster volume manager	Stripe and mirror files across disks in ASM Disk Groups	Automatic rebalances after storage configuration changes	Built on the reliable Oracle instance architecture
I/O operations DO NOT go through the ASM instance!	Manages storage as a global cluster of shared Disk Groups	ACFS extends the ASM management for non-database data	ASM along with ACFS define the Oracle Storage Stack

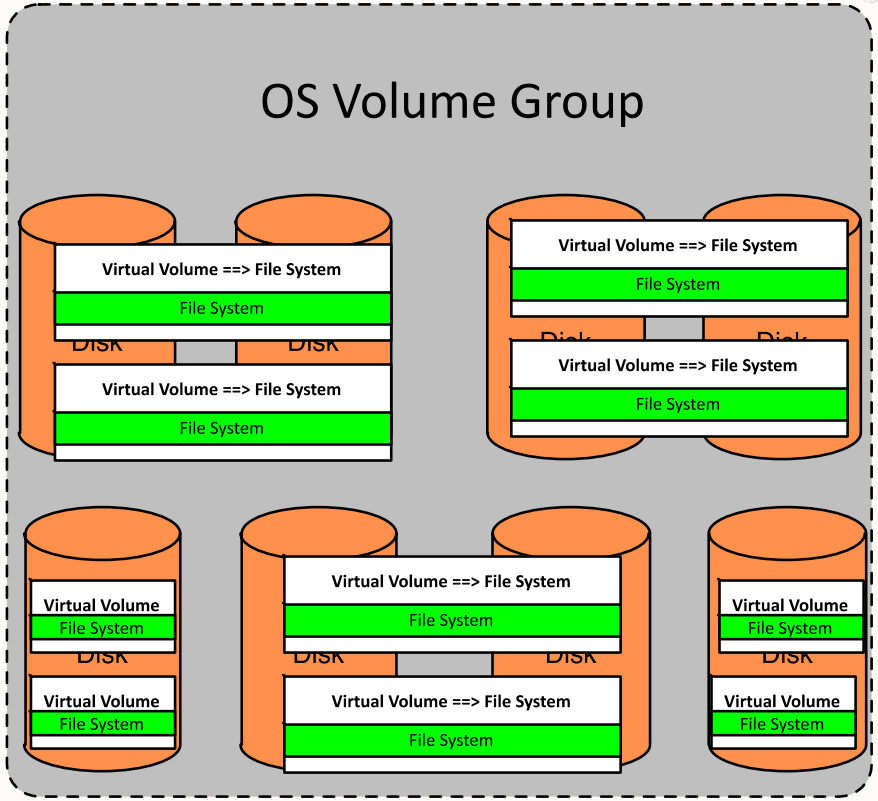
Oracle Stack versus Other Host-based Alternatives

ASM



ALL database files are striped and mirrored automatically across all ASM Disks

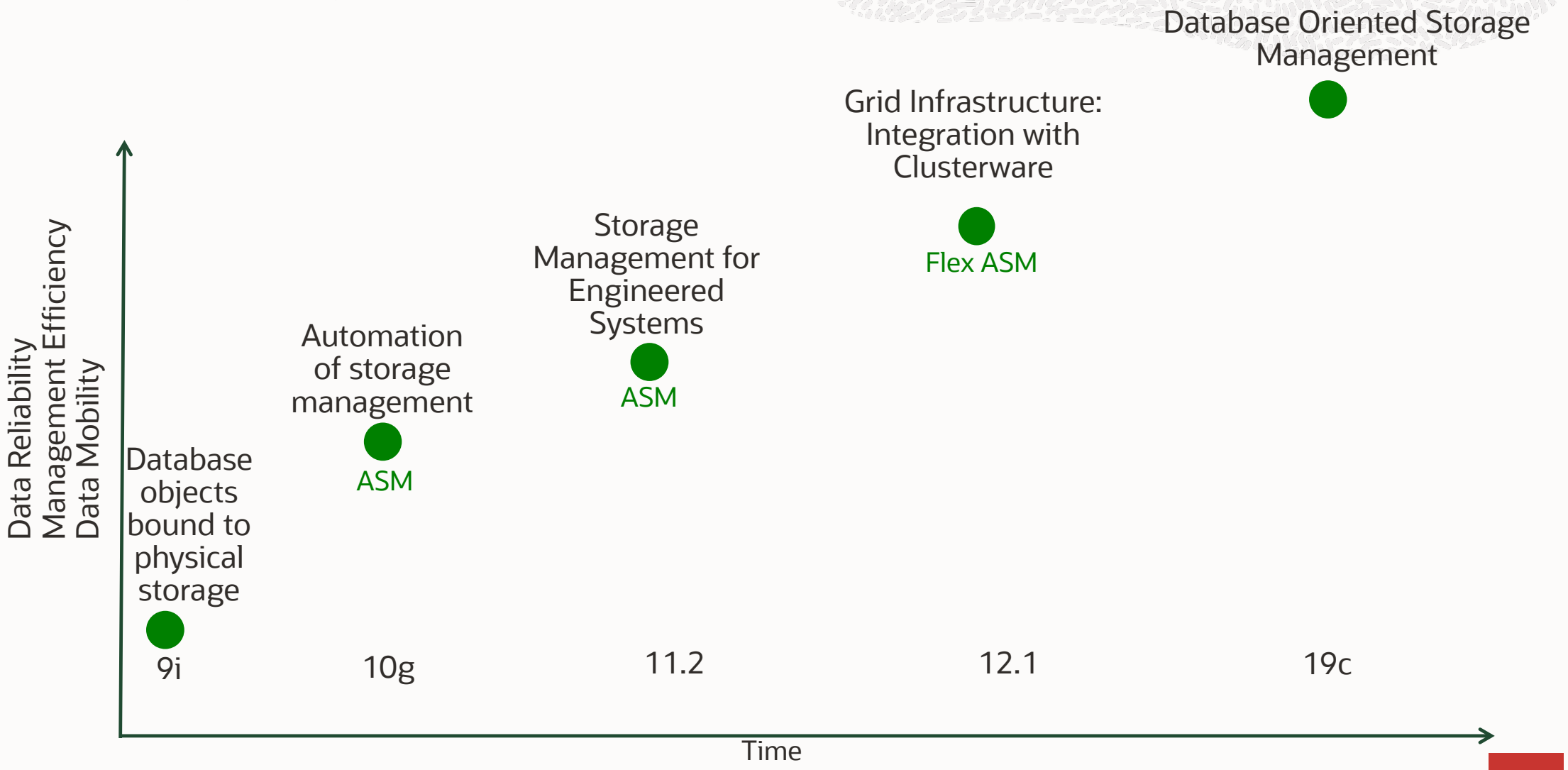
Host-based LVM/FS



Individual file mount points are created for each database. Organizations may have hundreds or even thousands of file systems and virtual volumes to manage.

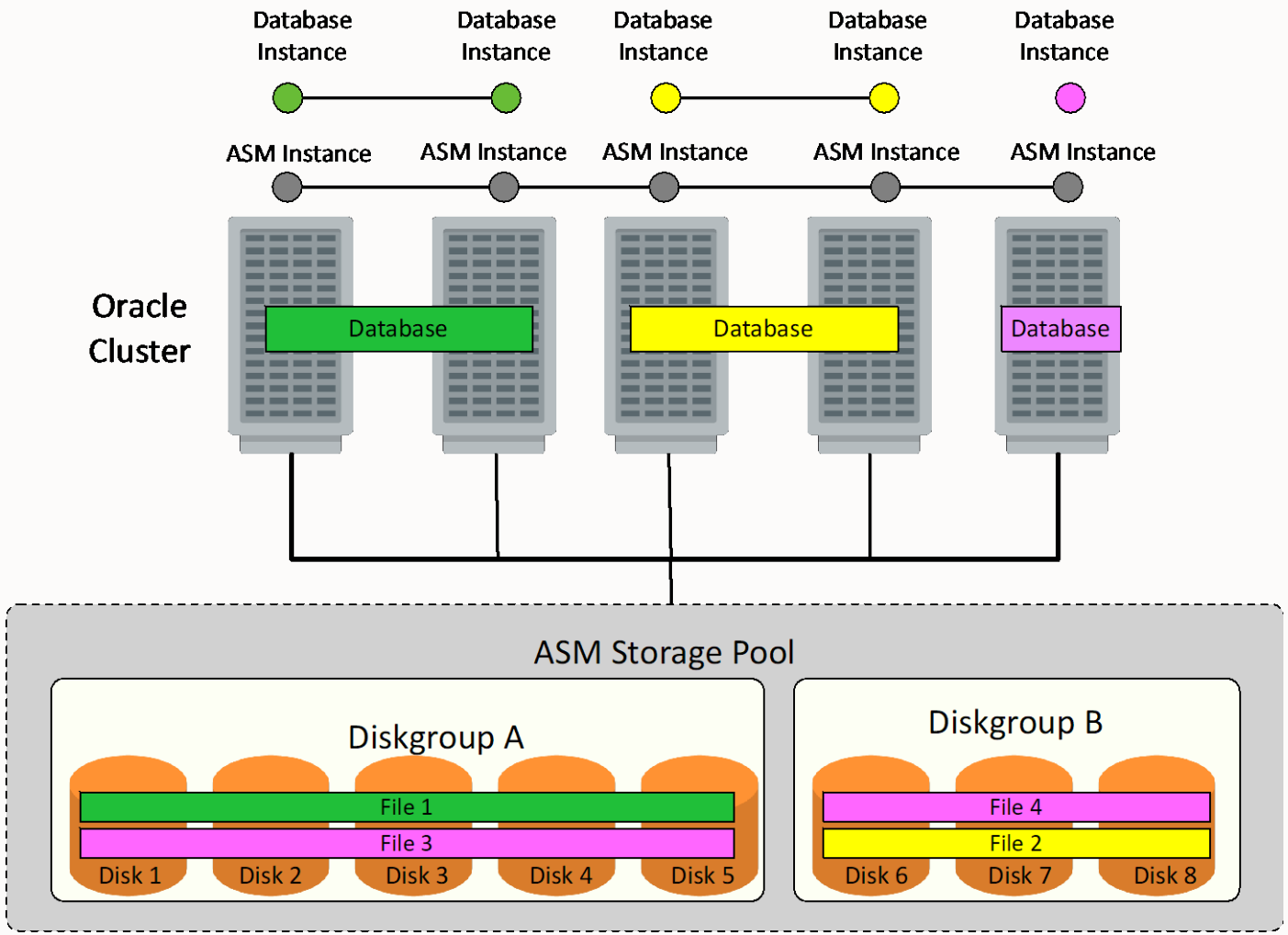
Evolution of the Oracle Storage Stack

Efficient Storage Management of Mission Critical Databases



ASM History 101

Before Oracle 12c



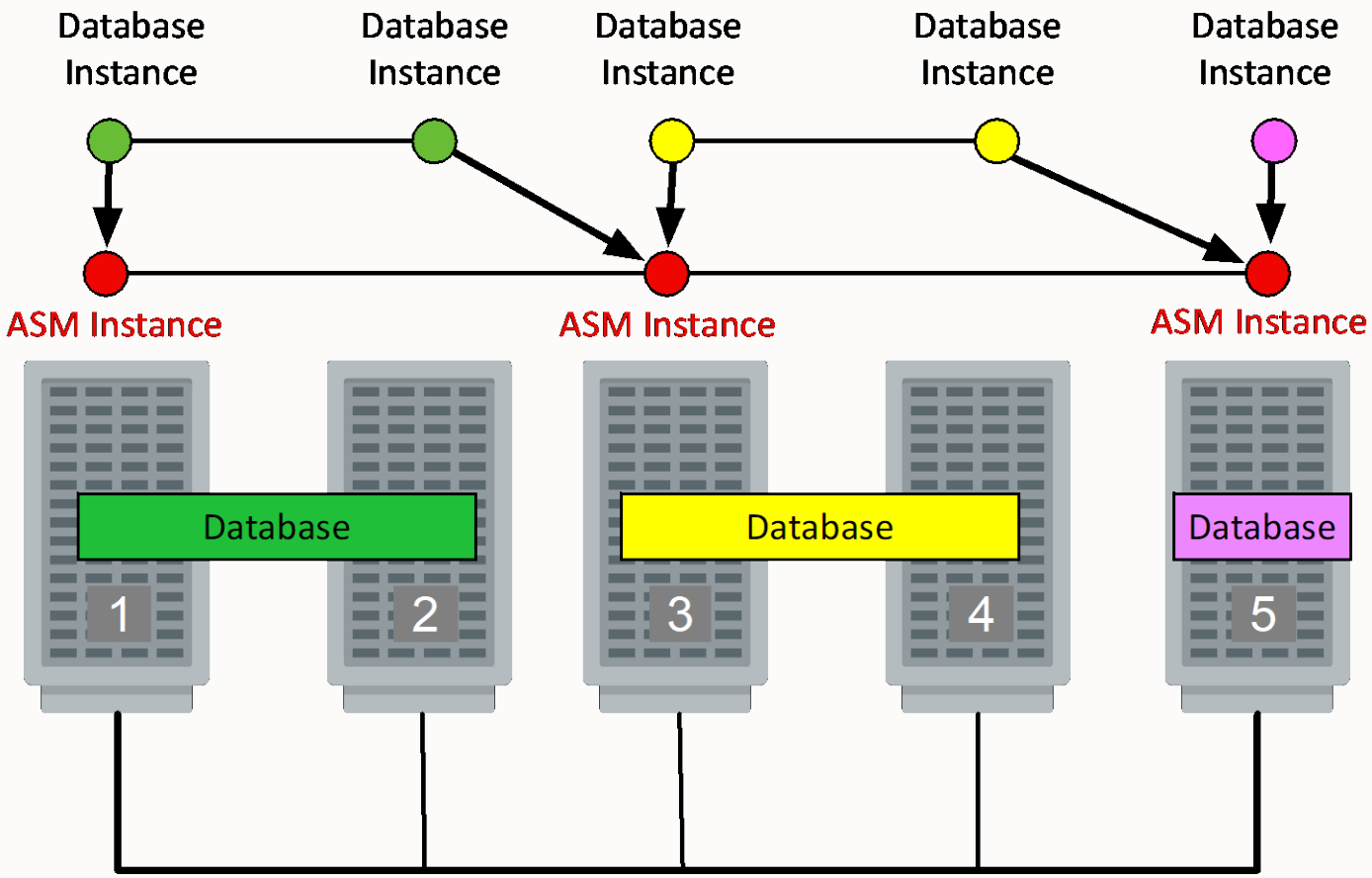
1-1 ASM to DB Server

Shared Diskgroups

Wide file Striping

Flex ASM

Oracle 12c Release 1

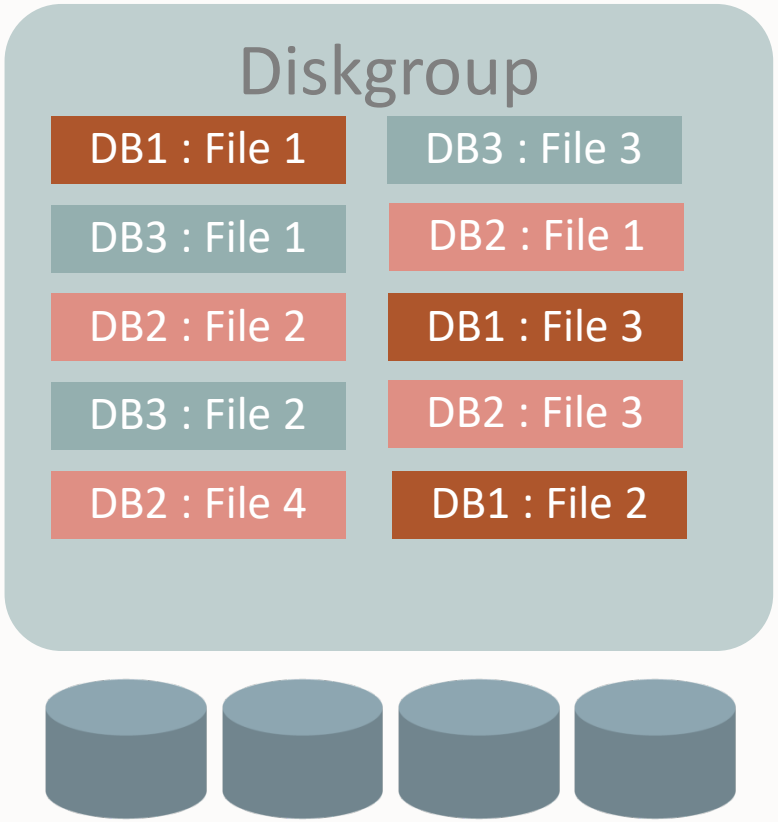


Eliminates the requirement for an ASM instance on every server

- Database instances connect to any ASM instance in the cluster
- Database instances can failover to a secondary ASM instance
- Administrators specify the cardinality of ASM instances (default is 3)
- Clusterware ensures ASM cardinality is maintained

Diskgroup-oriented Storage Management (12.1)

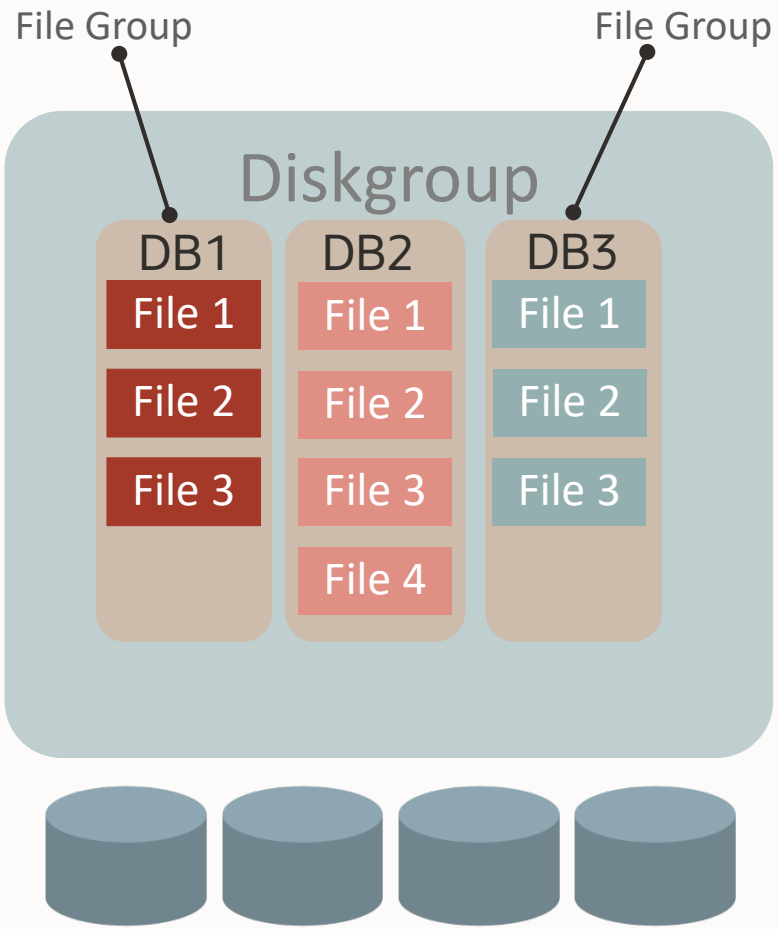
12.1 Diskgroup Organization



- Diskgroups contain files striped across disks and optionally mirrored.
- No distinction between individual databases.
- Easy to manage, but made consolidation difficult.

Database-oriented Storage Management (19c)

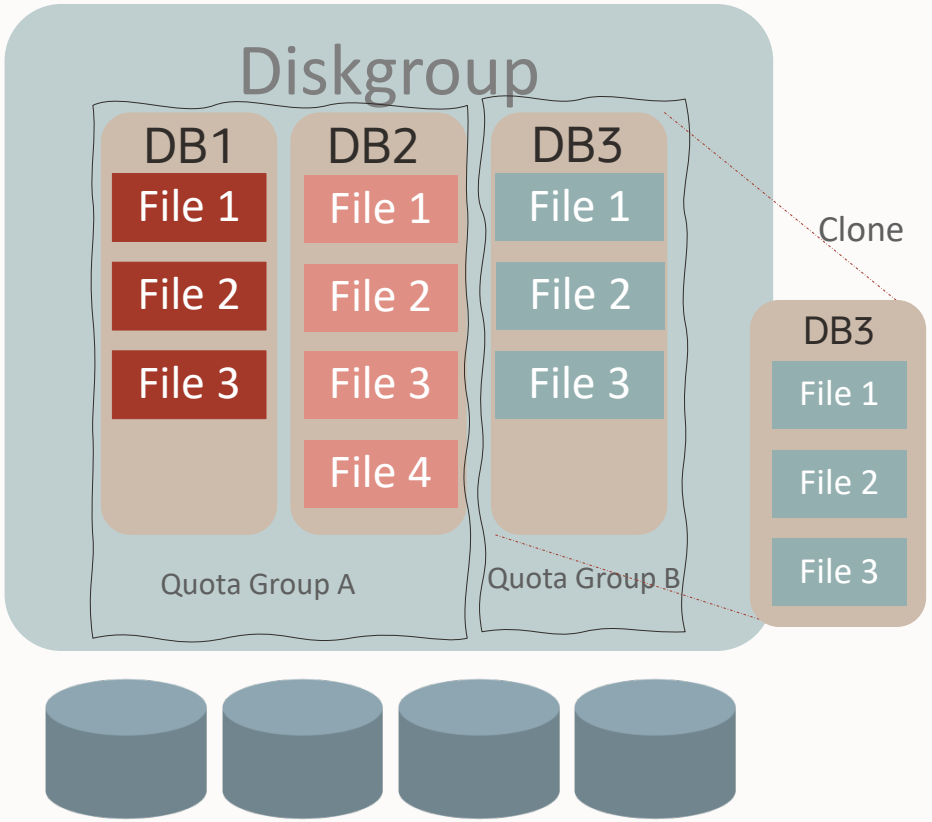
Flex Diskgroup organization (19c and higher)



- New Diskgroup type: **Flex Diskgroups**
- Flex Diskgroups provide File Groups
- A File Group is the collection of files belonging to individual databases or PDBs
- A File Group's name defaults to the database or PDB name

ASM File Group Flexibility and Availability

Flex Diskgroup quota management

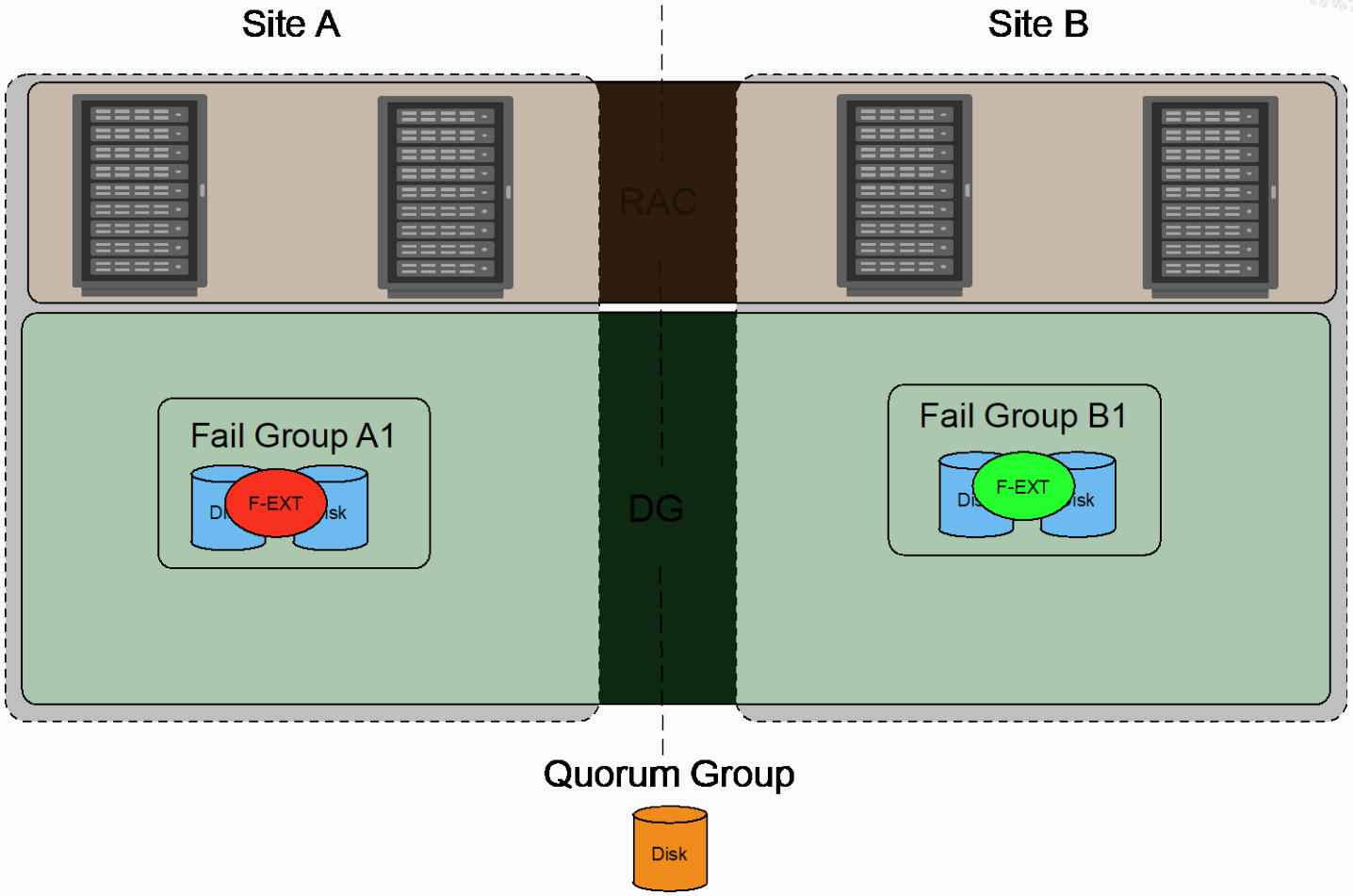


Flex Diskgroups enable

- **Quota Management** - limit the space databases can allocate in a diskgroup and thereby improve the customers' ability to consolidate databases into fewer DGs
- **Redundancy Change** – utilize lower redundancy for less critical databases
- **ASM Database Clones** to easily and dynamically create database clones for test/dev or production databases

Oracle RAC on Extended Clusters

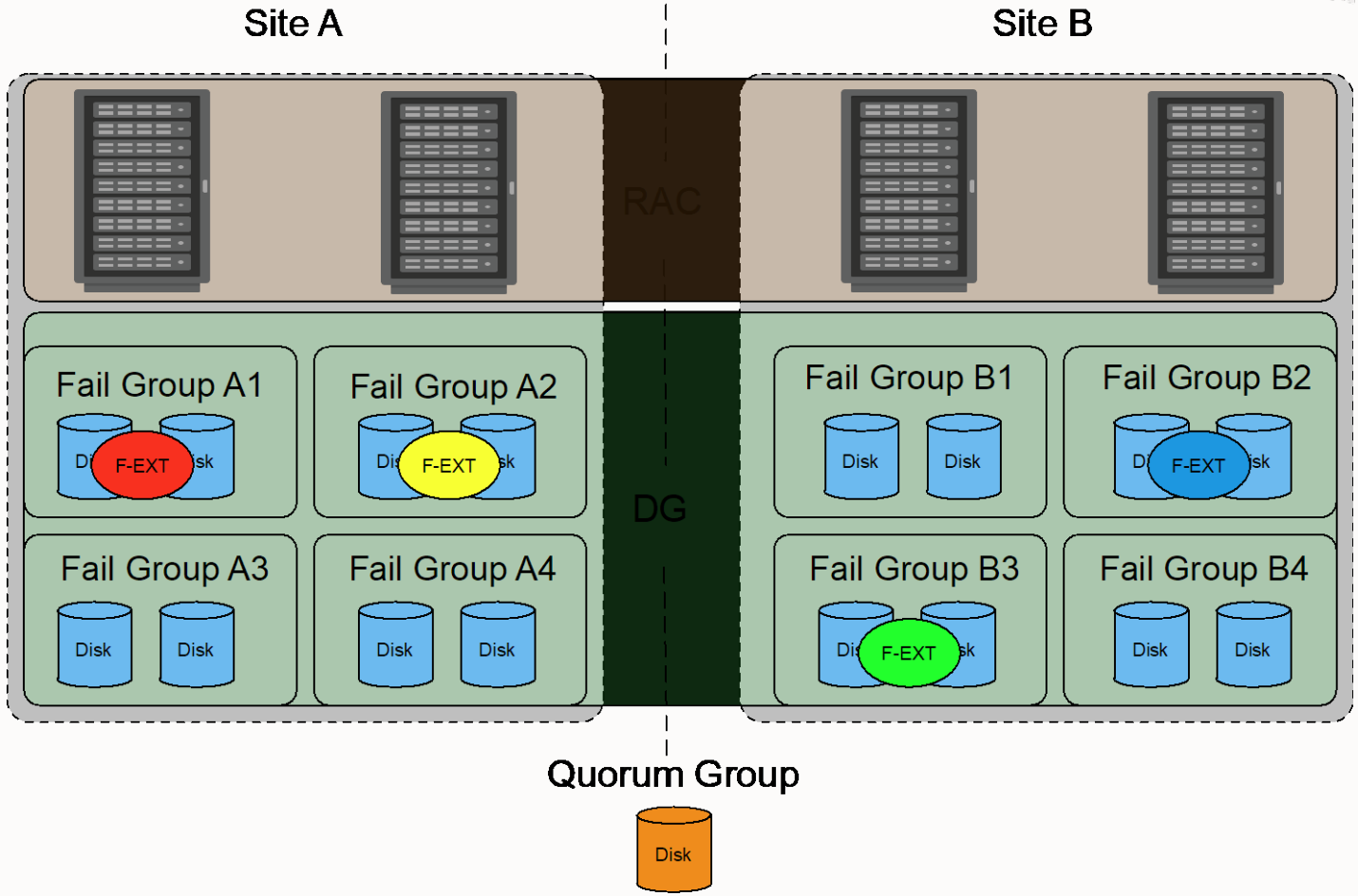
Extreme Availability



- Previously, Extended RAC supported two Failure Groups

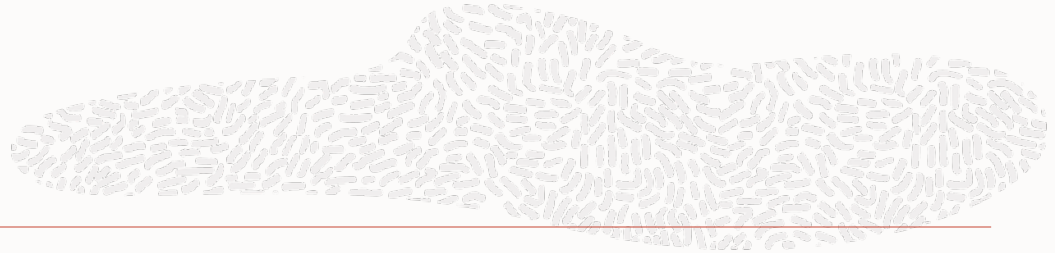
Oracle RAC on Extended Clusters

Extreme Availability



- Previously, Extended RAC supported two Failure Groups
- New Diskgroup type: Extended Diskgroup
  - Multiple FGs per site
  - Support for 3 Sites
  - Survive loss of Failure Group
  - Survive loss of site
  - Supports Exadata
- Built on Flex ASM
  - Flex Diskgroups
- Supported by Oracle installer

Key Benefits of Oracle ASM



Oracle ASM greatly simplified Oracle Database Storage Management.

Implements Stripe and Mirror Everything (SAME).

Available on all platforms including Engineered Systems.

New Database-oriented Storage Management for efficient management, data reliability and mobility.

Scrubbing capabilities by diskgroup, file or Extent.