

# SUSE

We Adapt. You Succeed.

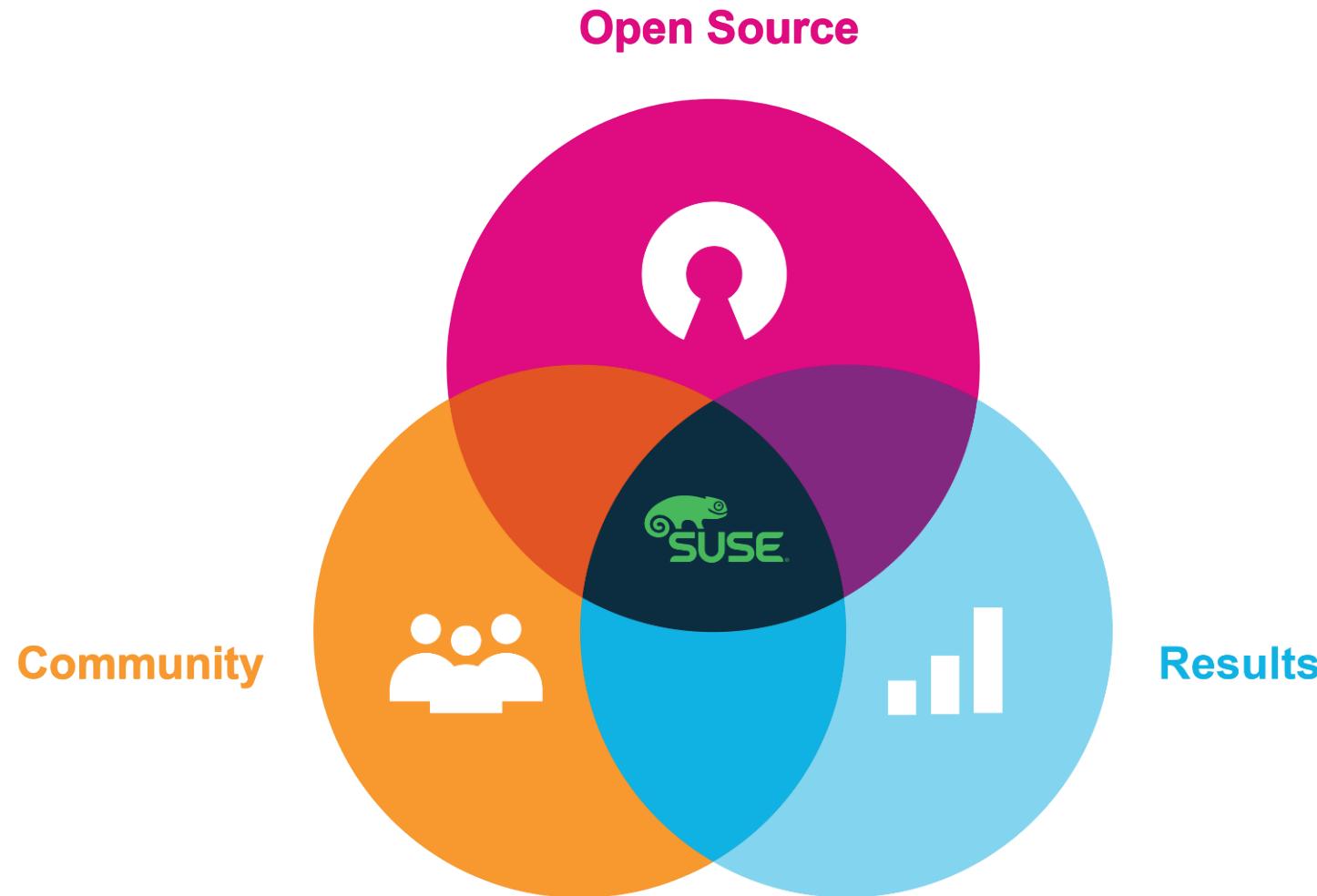


Tom D'Hont  
Sales Engineer  
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# Why Open Source?

# Open Source Relevancy and Value



# Community Involvement

 <b>OPEN CONTAINER INITIATIVE</b>	 <b>mozilla FOUNDATION</b>	 <b>QEMU</b>	 <b>spec</b>	 <b>GNOME™</b>	 <b>openHPC</b>
 <b>kubernetes</b>	 <b>YaST</b>	 <b>openstack</b>	 <b>KVM</b>	 <b>Spacewalk</b>	
 <b>OPEN MAINFRAME PROJECT</b>	 <b>X.Org</b>	 <b>openSUSE.</b>	 <b>nvm EXPRESS</b>	 <b>open build service</b>	
 <b>Electronic System Design Alliance</b>	 <b>OPNFV</b>	 <b>Zero Outage INDUSTRY STANDARD</b>	 <b>THE LINUX FOUNDATION</b>	 <b>ceph</b>	 <b>CLOUD NATIVE COMPUTING FOUNDATION</b>
	 <b>openinventionnetwork</b>		 <b>CLOUD FOUNDRY</b>	 <b>eGI</b>	

# Why SUSE?

# Our Vision for You

An always open  
enterprise that empowers  
your possibilities.



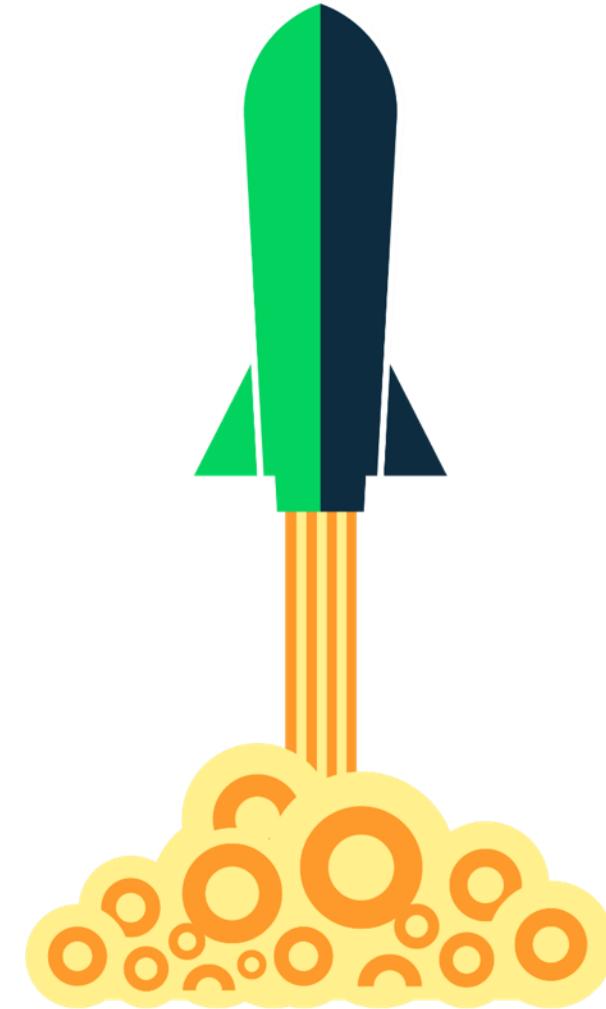
# Our Mission

To provide and support enterprise-grade Linux and open source solutions with exceptional service, value and flexibility.



# Our Strategy

**With partners and communities, we innovate, adapt and deliver secure open source technologies to create solutions for mixed enterprise IT environments.**



1991 – The Birth of Linux



# SUSE Timeline

## 1992 to 2000

### The Pioneering Years



**1992**

S.u.S.E. founded  
(German acronym  
for “Software und  
System-Entwicklung”).

SLS is released,  
it's the first  
comprehensive  
Linux distribution.

**1994**

S.u.S.E Linux  
1.0 ships on  
floppies.

**1996**

S.u.S.E  
Linux 4.2  
is the first  
true SUSE  
distribution.

**1997-1998**

SUSE  
becomes  
Europe's  
leading Linux  
distribution.  
  
SUSE enters  
North America  
market.

**1999**

IBM, SAP  
and Oracle  
partnerships  
announced.

SUSE Linux  
Enterprise  
Server released.

SUSE enters  
Asia Pacific  
market.

**2000**

SUSE Linux  
Enterprise  
Server released.  
  
SUSE Linux  
Enterprise  
Server for IBM  
s/390.

SUSE helps  
AMD port Linux  
to x86-64  
architecture.

## 2001 to 2009

### Building a Strong Ecosystem

**2001**

SUSE Linux Enterprise Server for x86 released.

**2002-2003**

Intel, AMD, HP, Fujitsu and other major partnerships announced.

**2004**

openSUSE Launched.

**2006**

Microsoft and SUSE announce interoperability agreement.

SUSE offers first Enterprise virtualization technology integration for Linux (Xen).

**2009**

SUSE Linux Enterprise Server 11 released with KVM.  
SUSE Studio launched.



## 2010 to Present

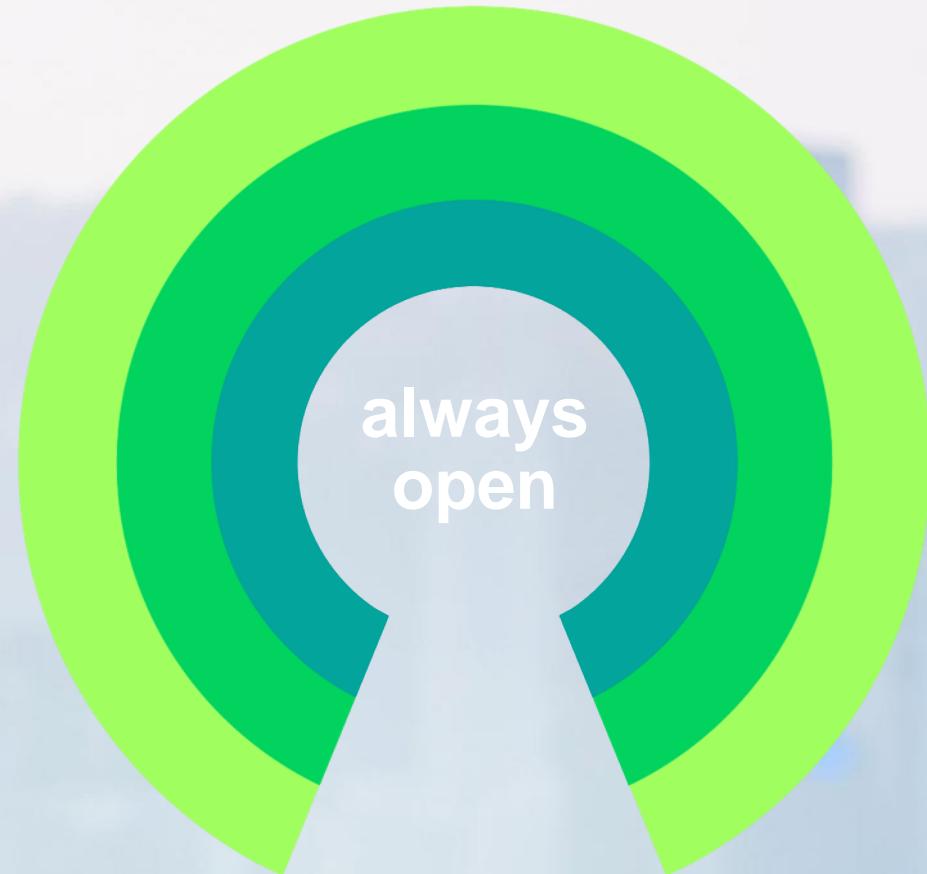
### Enabling an Always Open Data Center

2010	2011	2012	2014	2015	2016	2017
VMware partnership announced. SUSE Linux Enterprise available on Amazon EC2.	SUSE Manager released. SUSE OpenStack Cloud launched.  SUSE Linux Enterprise Server for SAP Applications released.	SUSE Linux Enterprise available on Microsoft Azure.  SUSECON launched in North America.	SUSE joins Micro Focus. SUSE Linux Enterprise 12 released.	SUSE Enterprise Storage based on Ceph launched.  SUSE joins Cloud Foundry.	SUSE CEO joins Micro Focus board. SUSE acquires openATTIC Storage Management assets.	SUSE acquires OpenStack IaaS and Cloud Foundry PaaS talent and technology assets from HPE.  SUSE celebrates its 25 <sup>th</sup> anniversary.

# What Do We Mean by Always Open?

**It's not just WHAT we do.  
It's HOW we do it.**

- True to open source vision
- Zero lock-in for customers
- Open to partnering



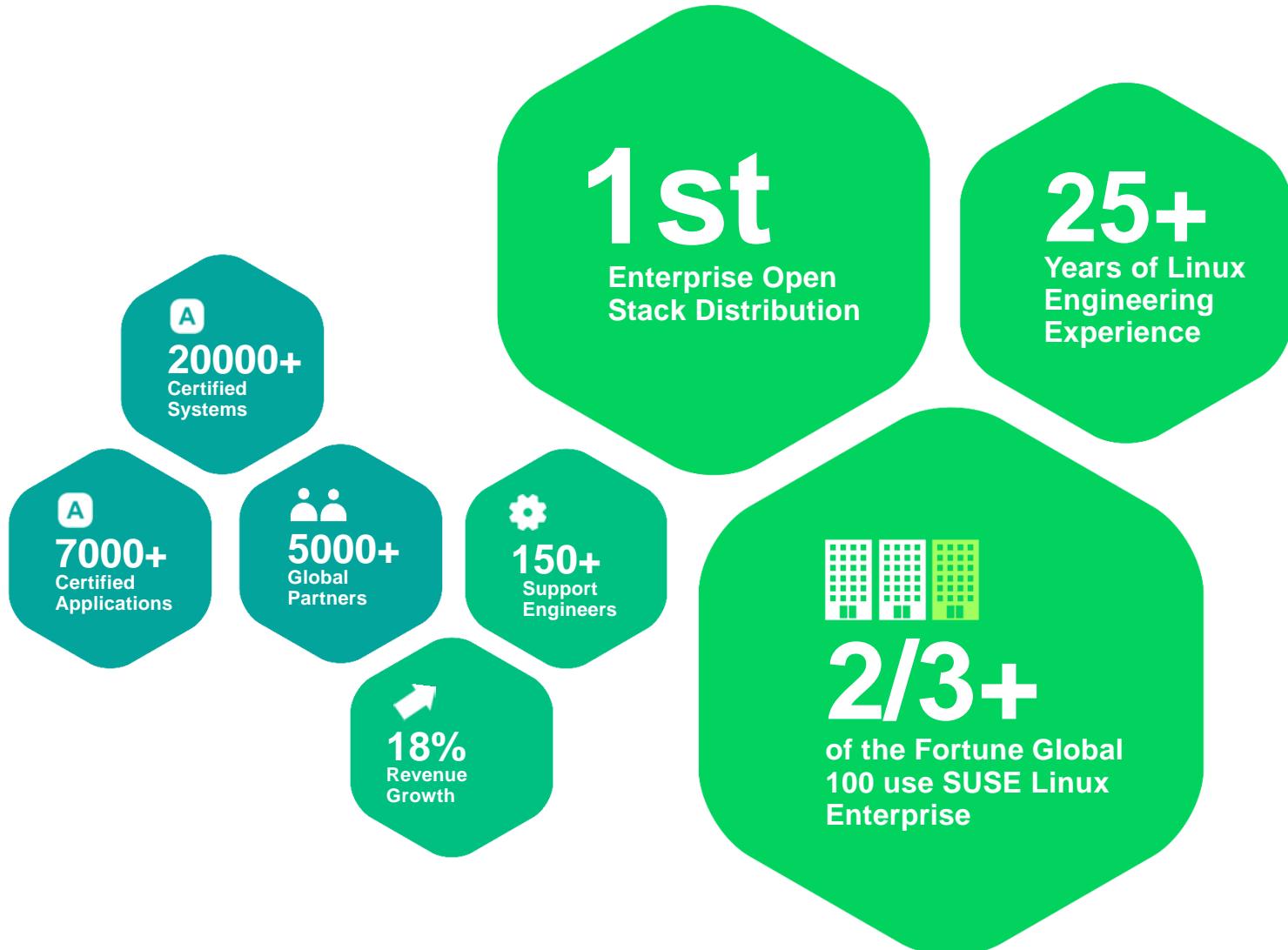
# Leading Technology Innovation



## SUSE was the first to:

- Develop enterprise Linux on SAP HANA, AWS and Azure public cloud
- Lead development of the commercial Linux market by delivering the first commercially supported Linux distribution
- Allow instant rollback of operating system changes
- Pioneer continuous availability through live patching for mission-critical systems, including SAP HANA environments
- Deliver a Linux high availability solution that supports geographic mirroring with a broad set of redundancy configurations
- Champion for simplified single system Linux configuration and management
- Deliver the first commercially supported OpenStack distribution
- Bring an innovative approach to simplify the deployment of configurable infrastructure (OBS)
- Give consistent support on multiple system architectures by using a common code base
- Provide efficient multiple systems software and asset management built on leading open source technology such as Salt
- Facilitate DevOps adoption through inclusion of Docker technology in SUSE Linux Enterprise Server
- Create the Portus project to simplify and secure management of Docker registries

# SUSE at a Glance



# SUSE Worldwide Offices



# SUSE and EQT

## Developing Companies Across the Globe

- EQT invests into successful, midmarket businesses around the globe with a mission to help them develop into great and sustainable companies.
- During EQT's ownership, number of employees increased on average by 10%, sales by 10% and EBITDA by 11% each year.
- Will support the SUSE build and buy strategy with funding and industrial expertise.

## What EQT is Saying About SUSE

"We were impressed by SUSE's strong performance over the last years as well as by its strong culture and heritage as a pioneer in the open source space. These characteristics correspond well to EQT's DNA of supporting and building strong and resilient companies, and driving growth." — *Johannes Reichel, Partner at EQT*



[www.eqtpartners.com](http://www.eqtpartners.com)

# SUSE Announcements

# The iRODS Consortium



## SUSE

SUSE provides and supports enterprise-grade Linux and open source solutions with exceptional service, value and flexibility. With partners and communities, we innovate, adapt and deliver secure Linux, cloud infrastructure and storage software to create solutions for mixed enterprise IT environments. We help customers harness the benefits and power of an open enterprise that can empower their possibilities.

For more information, visit [www.suse.com](http://www.suse.com)

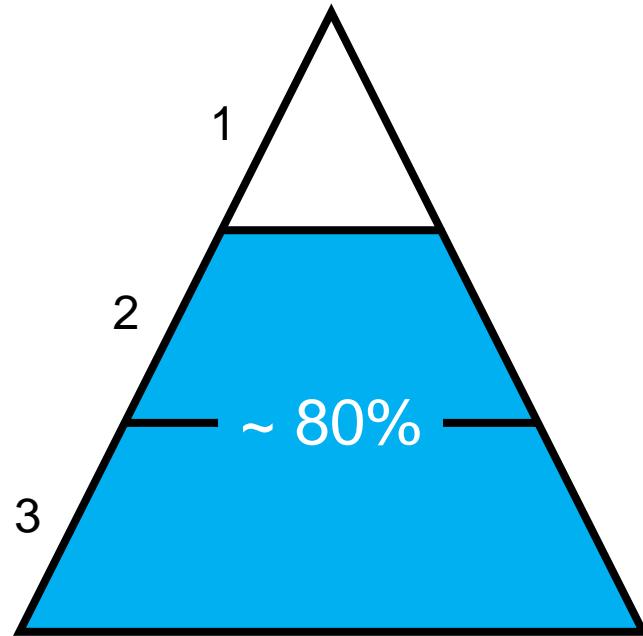


SUSE  
Enterprise Storage 6

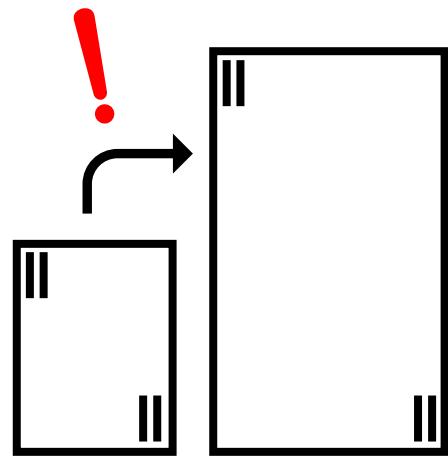


NAUTILUS

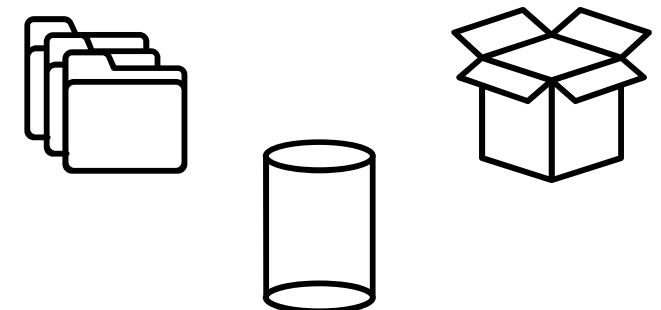
# SUSE Enterprise Storage 6



Consolidate



No migrations

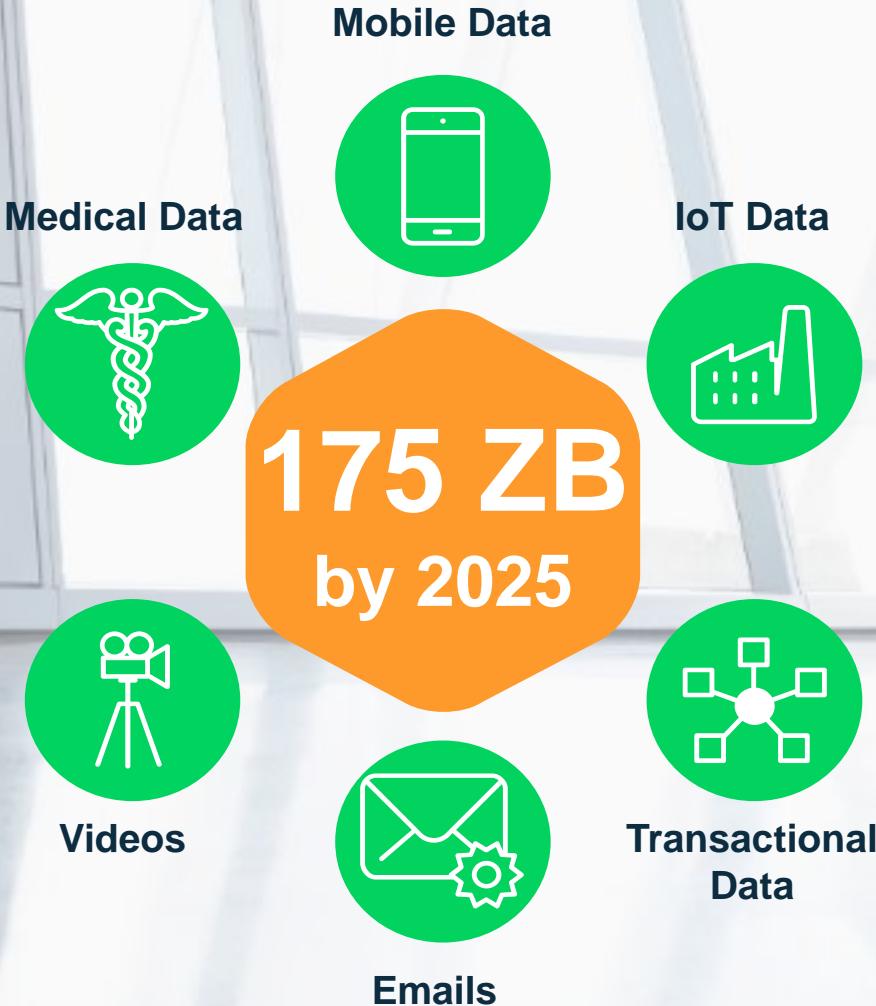


Flexible solution

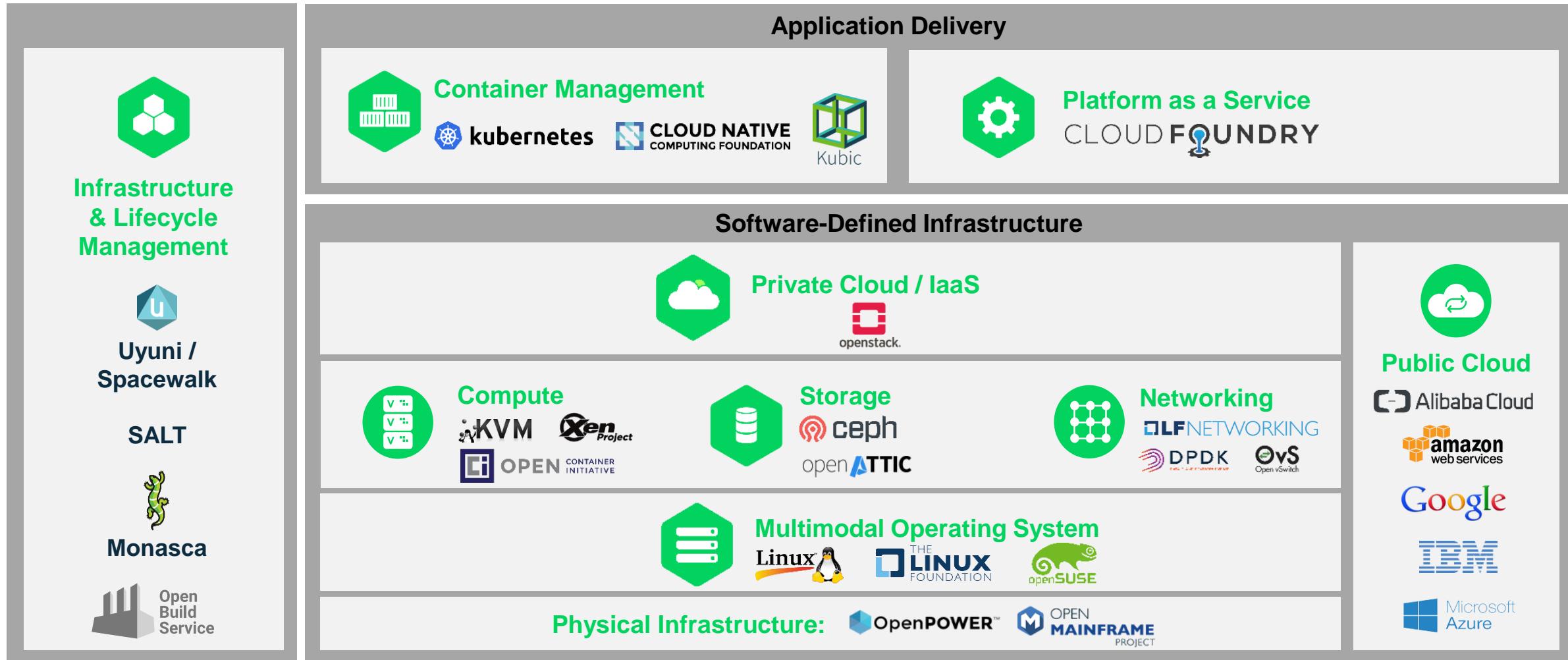


SUSE  
Enterprise Storage

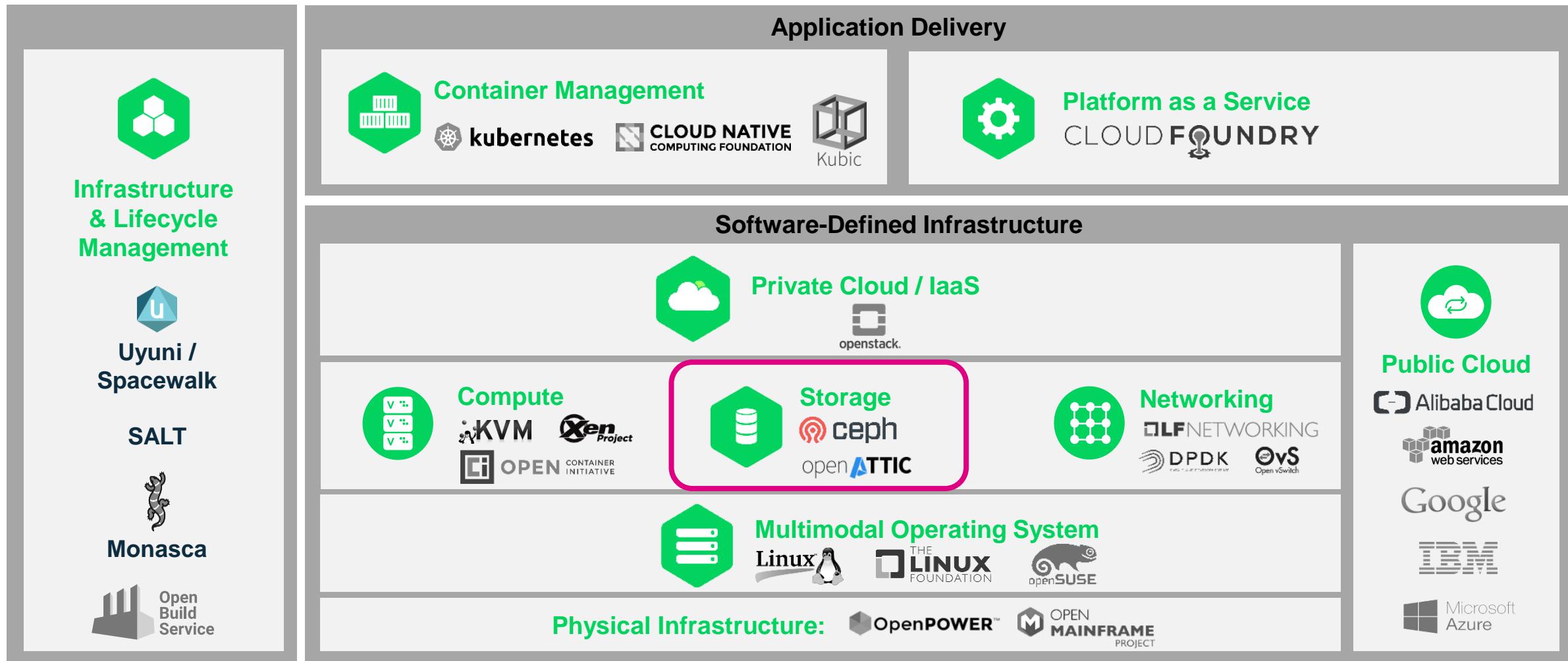
# The Data Explosion Continues



# Open Source at the Heart of Our SDI and Application Delivery Approach



# Open Source at the Heart of Our SDI and Application Delivery Approach



# 5 Questions

You should ask yourself

1. How long before my next storage migration project ?
2. How much do I currently pay per TB (per year) ?
3. How big is my entire storage estate ?
4. What is the open source strategy in my organization ?
5. How many different solutions are serving storage ?

# SUSE Enterprise Storage



Cloud Enabler of the Year



Storage Magazine Editors Choice



Availability Platform of the Year



# SUSE Enterprise Storage



<https://github.com/ceph>

90,050 commits

40 branches

262 releases

688 contributors

# SUSE Enterprise Storage

Using Industry Standard Servers and Disk Drives

Latest  
hardware

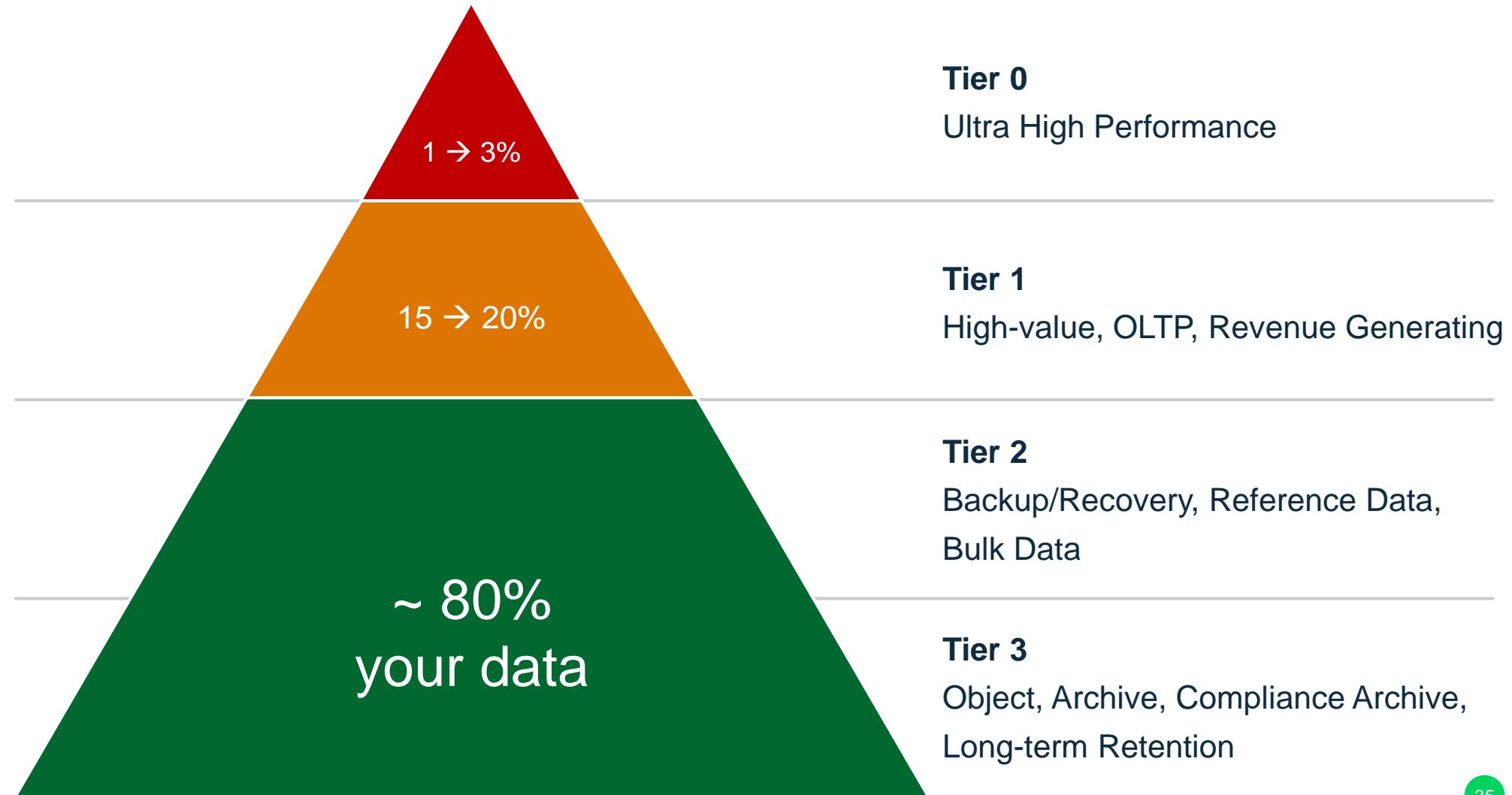
Storage  
migrations

Reduce  
OpEx

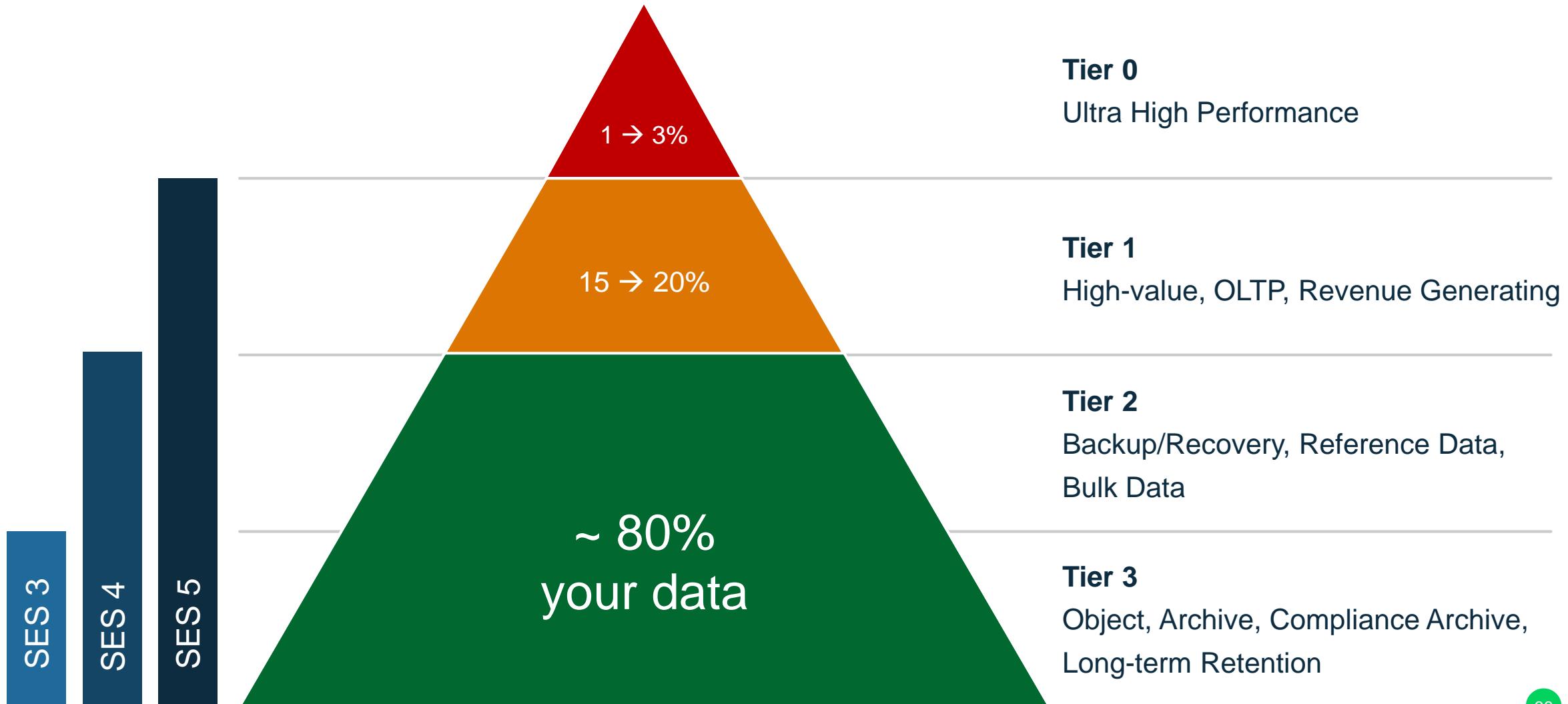
Hardware  
flexibility

Reduce  
CapEx

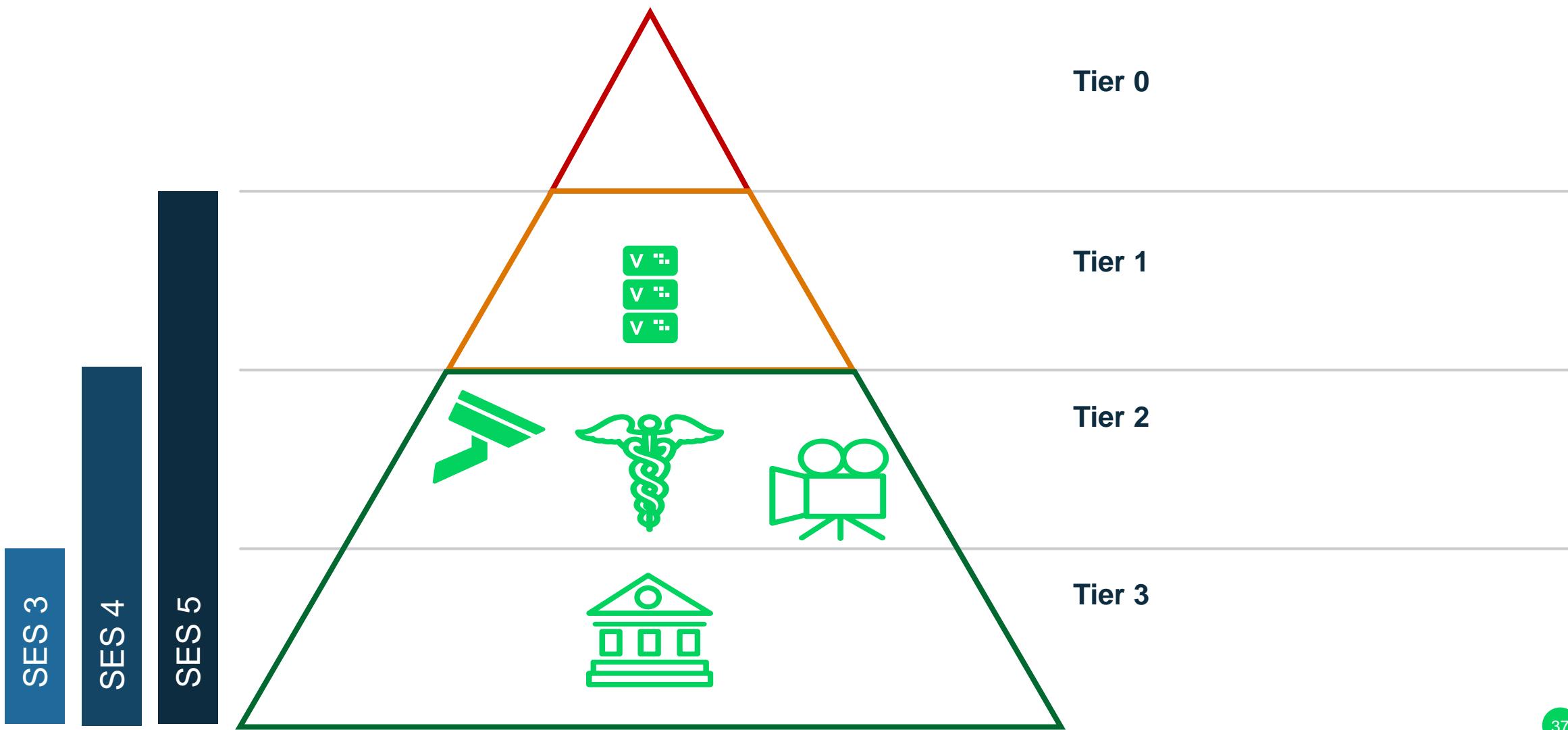
# Enterprise Data Capacity Utilization



# Enterprise Data Capacity Utilization



# Use Cases for Software Defined Storage



# Use Case Focused Solutions

## Partnership Ecosystem

### Classic Workloads

#### Backup to Disk Solution

COMMVAULT  
VERITAS

MICRO  
FOCUS  
Data Protector

veeam

SEP

bareos  
open source data protection

#### Data Management

iRODS

K  
komprise \*

#### HPC Storage

iRODS

Hewlett Packard  
Enterprise DME7

Lenovo

### Flexible Configs

#### Certified Reference Architectures

Hewlett Packard  
Enterprise

SUPERMICRO

Lenovo

DELL  
CISCO

#### Appliance

THOMAS  
KRENN®  
server.hosting.customized.

#### Public Cloud

Azure

### Cloud Native Workloads



SUSE OpenStack  
Cloud

#### Cloud & App Delivery



Container as a  
Service

#### Analytics



#### Custom Apps

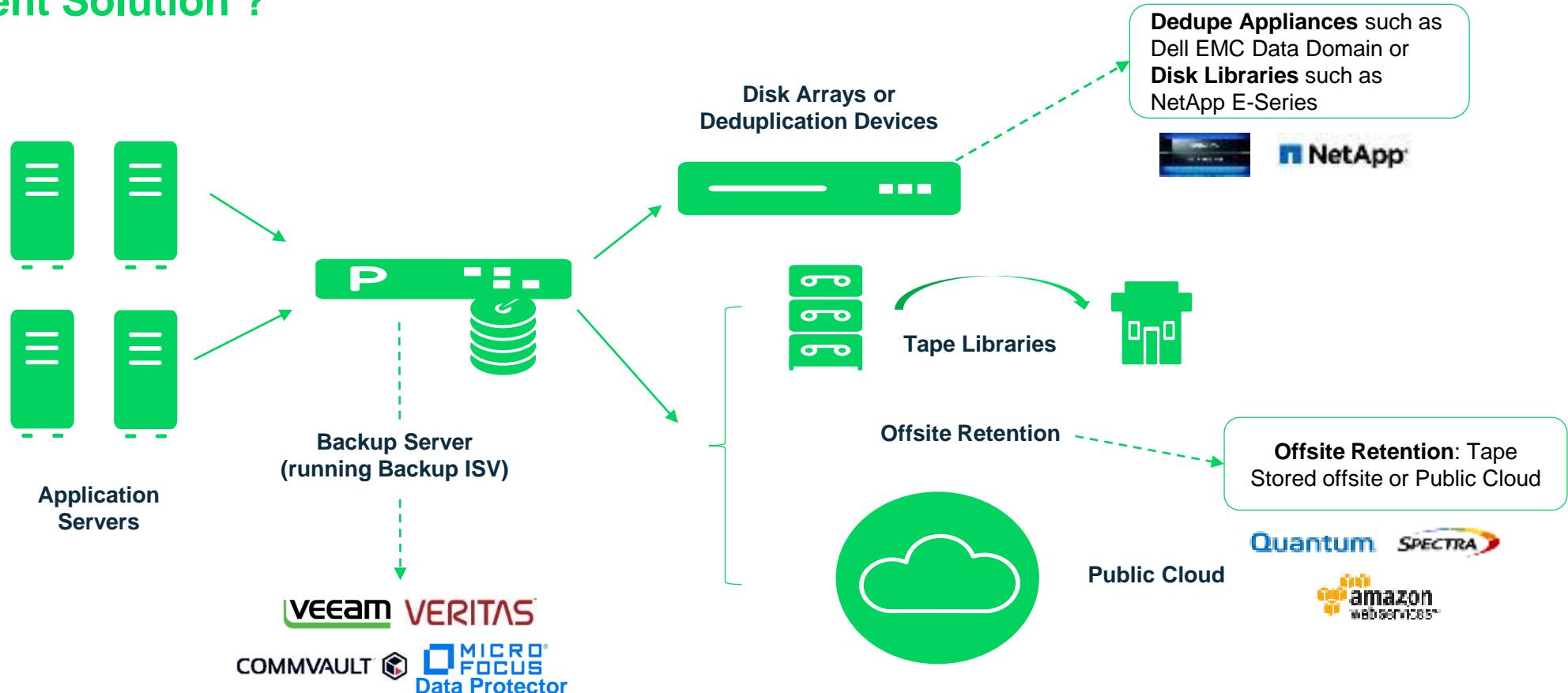


SUSE Enterprise Storage

\*: Coming Soon

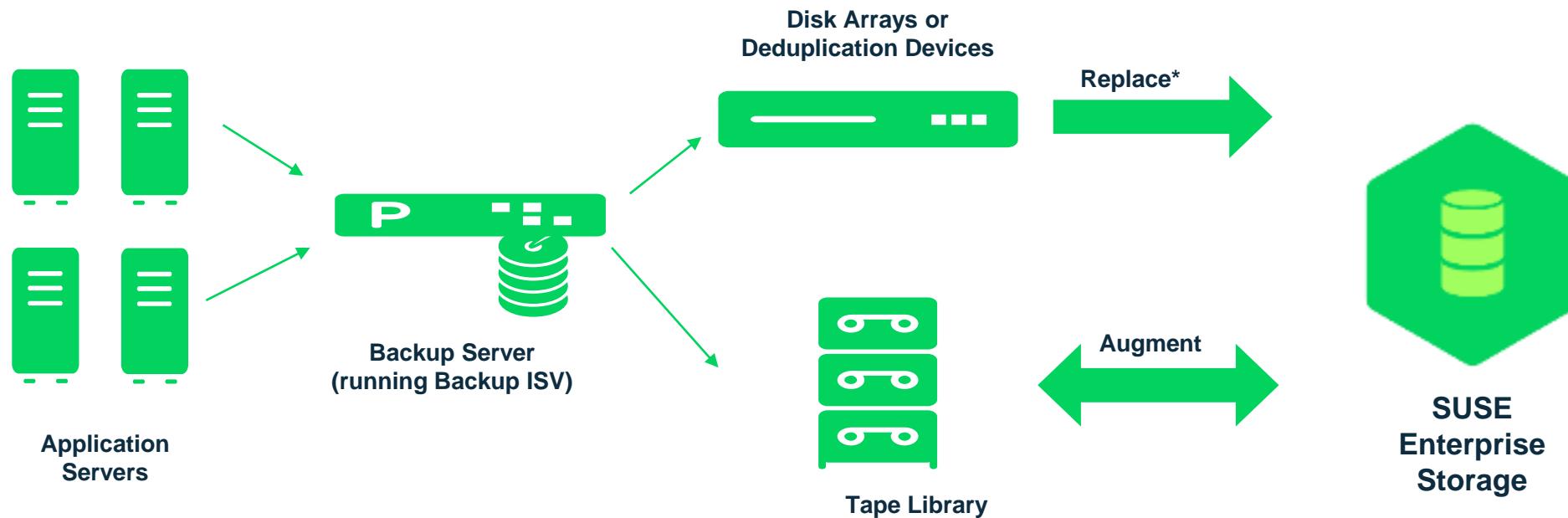
# Backup architecture

## Current Solution ?



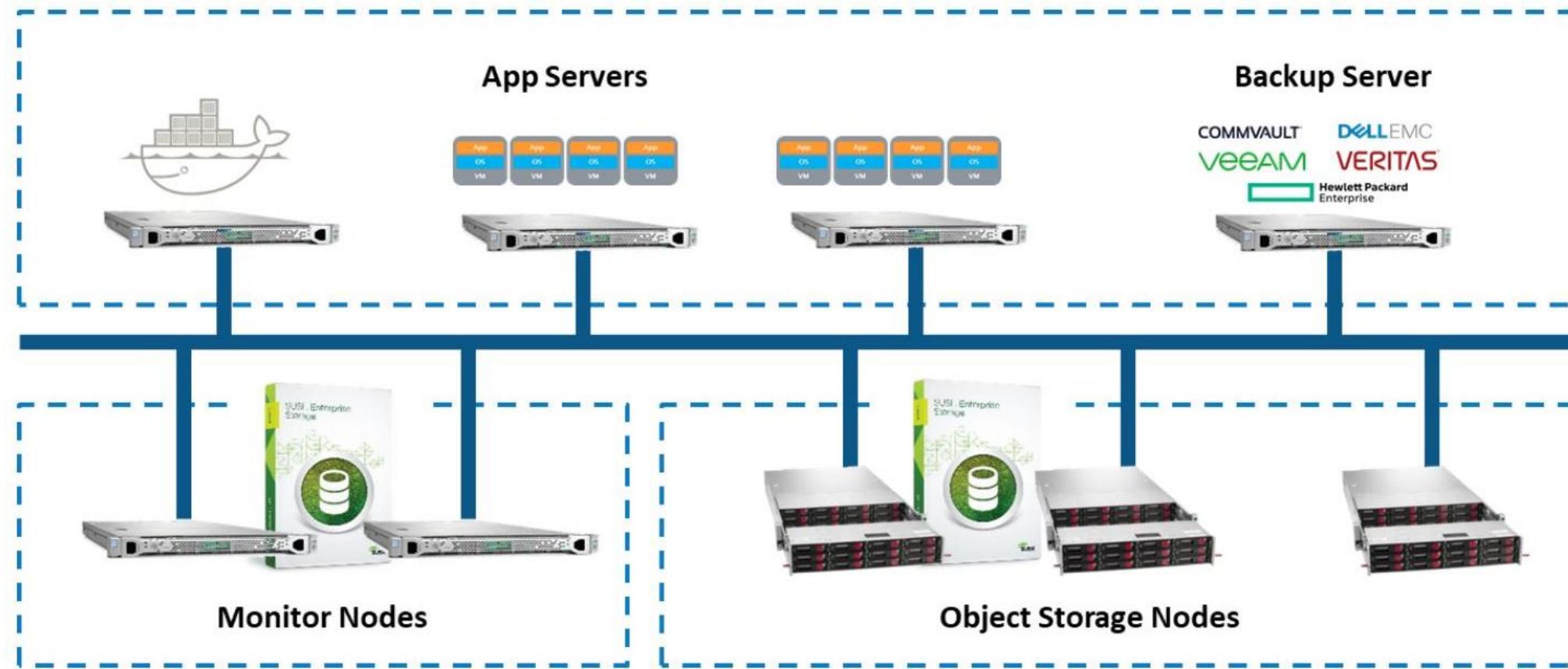
# Backup architecture

## SUSE Solution for Disk-based Backup



- SUSE Enterprise Storage will replace Disk Arrays or Dedupe Appliances in customer's disk-based backup environments
- Customers will be able to keep more storage online, hence SUSE Enterprise Storage augments the tape library in their solution
- Some customers may choose to remove tape all together

# Backup to Disk with SUSE Enterprise Storage



**TCO Case Study – IT Brand Pulse selected SUSE as the big winner!**  
<https://goo.gl/HbBdMt>

# SUSE Enterprise Storage 6

Launched June 2019

## Built On

- Ceph Nautilus release
- SUSE Linux Enterprise Server 15 SP1

## Manageability

- Ceph-Mgr dashboard (oA replacement)
- Ceph-Mgr dashboard localized
- Ceph-Mgr dashboard SSO (SAMLv2)
- Automatic metric reporting phase 1
- CephFS directory quotas

## Interoperability

- IPv6
- *RDMA back-end (tech preview)*

## Availability

- Sync to external cloud via S3
- CephFS snapshots
- *Asynchronous file replication (tech preview)*

## Efficiency

- QoS for RBD
- Background operation QoS

# SUSE and Service Packs

27-6-2019

SLES	Release	Kernel	SUSE Enterprise Storage	Ceph
<b>SLES 15 SP1</b>	<b>2019-06</b>	<b>4.12.14-195.1</b>	<b>6</b>	<b>Nautilus</b>
SLES 15	2018-07	4.12.14-23.1		
SLES 12 SP4	2018-12	4.12.14-94.41.1		
<b>SLES 12 SP3</b>	<b>2017-08</b>	<b>4.4.73-5.1</b>	<b>5</b>	<b>Luminous</b>
SLES 12 SP2	2016-11	4.4.21-69.1		
SLES 12 SP1	2015-12	3.12.49-11.1		
SLES 12	2014-11	3.12.28-4.6		

[https://en.wikipedia.org/wiki/SUSE\\_Linux](https://en.wikipedia.org/wiki/SUSE_Linux)

[https://wiki.microfocus.com/index.php/SUSE/SLES/Kernel\\_versions](https://wiki.microfocus.com/index.php/SUSE/SLES/Kernel_versions)

# SUSE Enterprise Storage

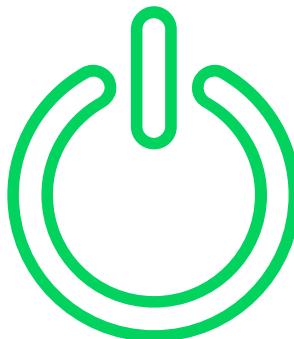
## Consulting

### SUSE TestDrive: Enterprise Storage



Proof-of-concept evaluating  
software-defined storage  
customers' fit for use.

### SUSE Start: Enterprise Storage



Quickly realize the value of  
customer's investment in  
SUSE Enterprise Storage.

### SUSE Implement: Enterprise Storage

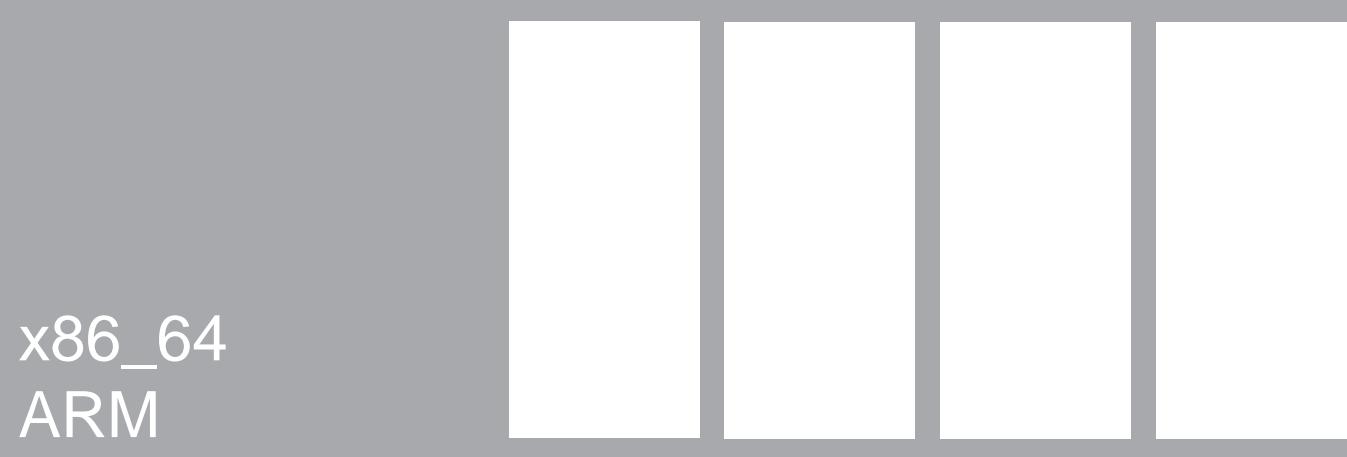


Turn-key, full-scale  
deployment tailored to  
customers' requirements.

# Ceph 101

OSD

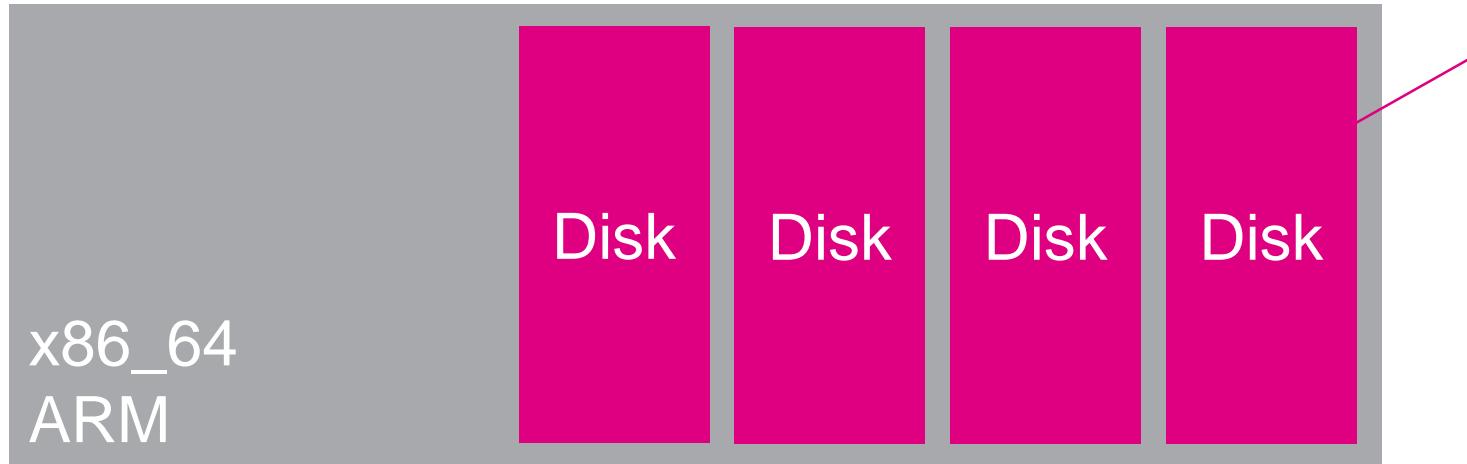
# Storage Node



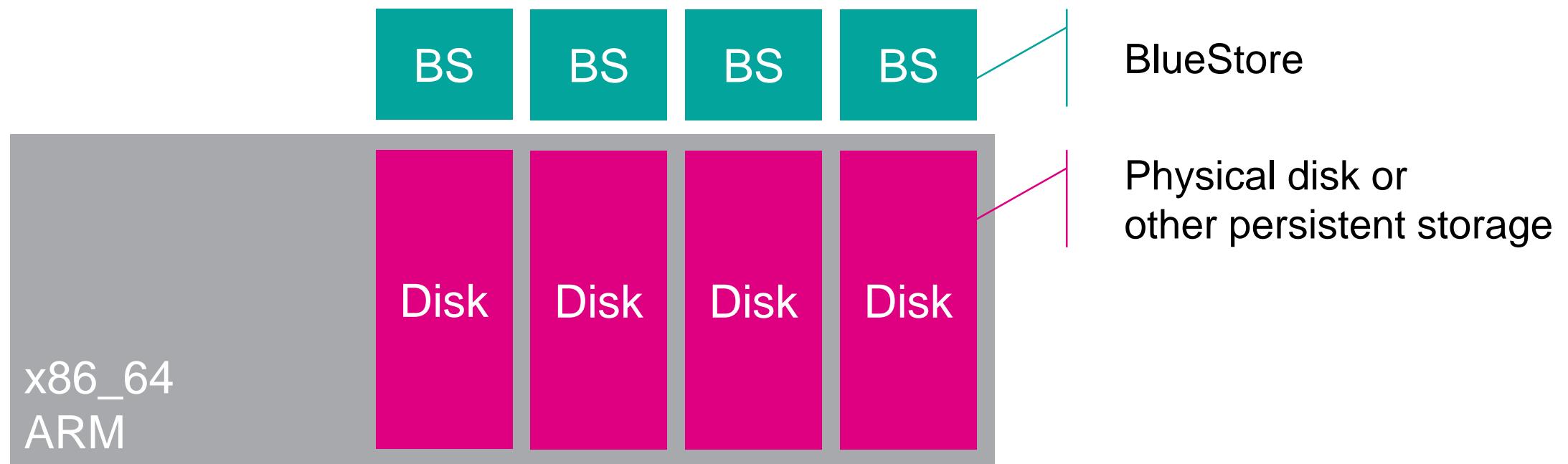
x86\_64  
ARM

# Storage Node

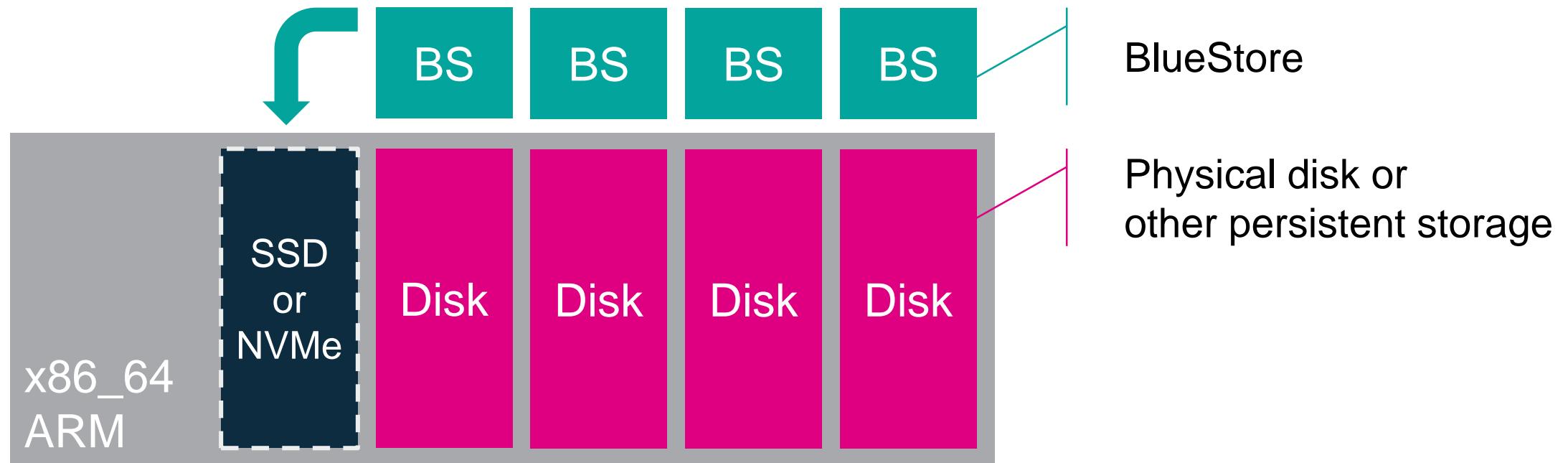
OSD



# Storage Node

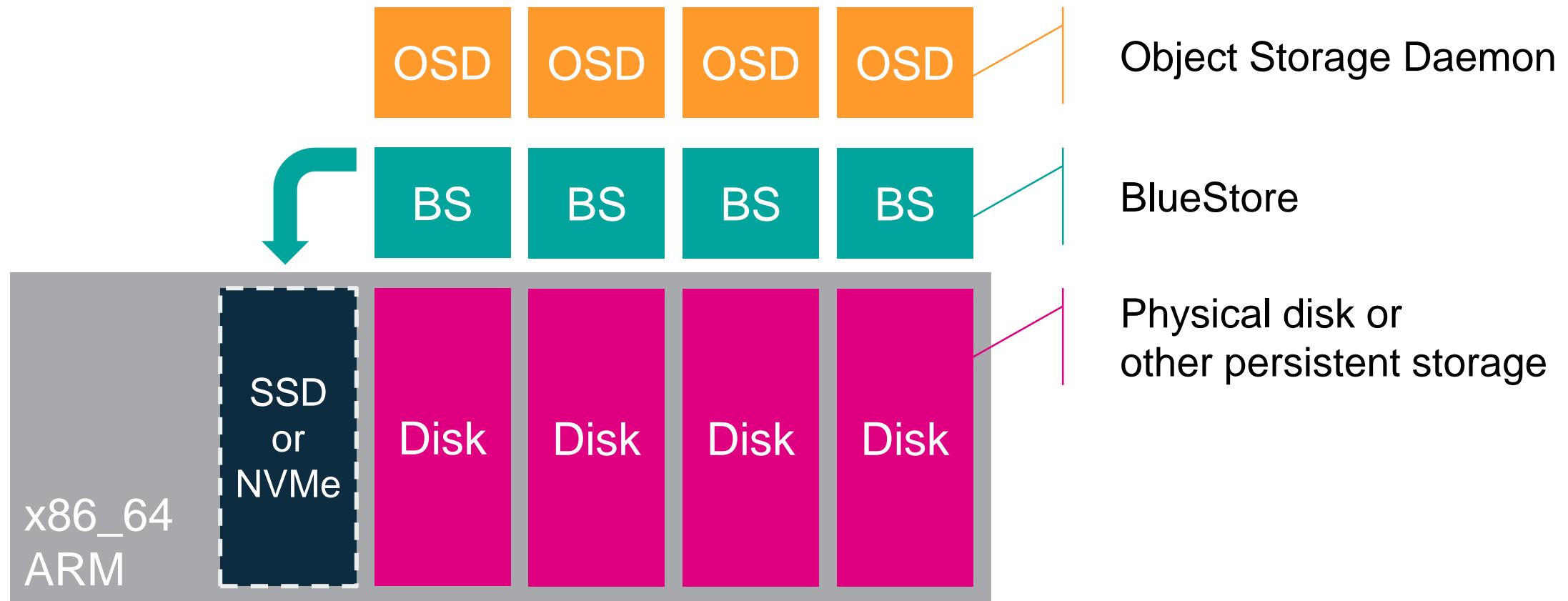


# Storage Node



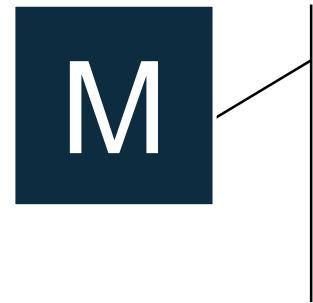
# Storage Node

OSD



# Monitor Node

M



Brains of the cluster  
Cluster membership: up, down, in, out  
Distributed decision making  
Not in the performance path  
Do not serve stored object to clients

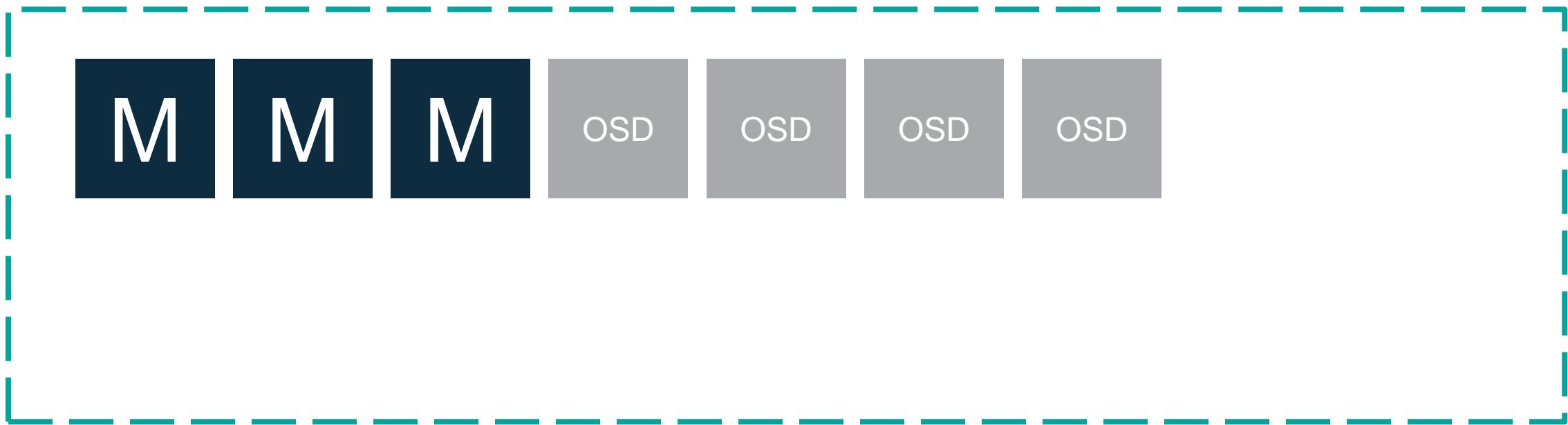
# RADOS Cluster

**Reliable Autonomous Distributed Object Store**



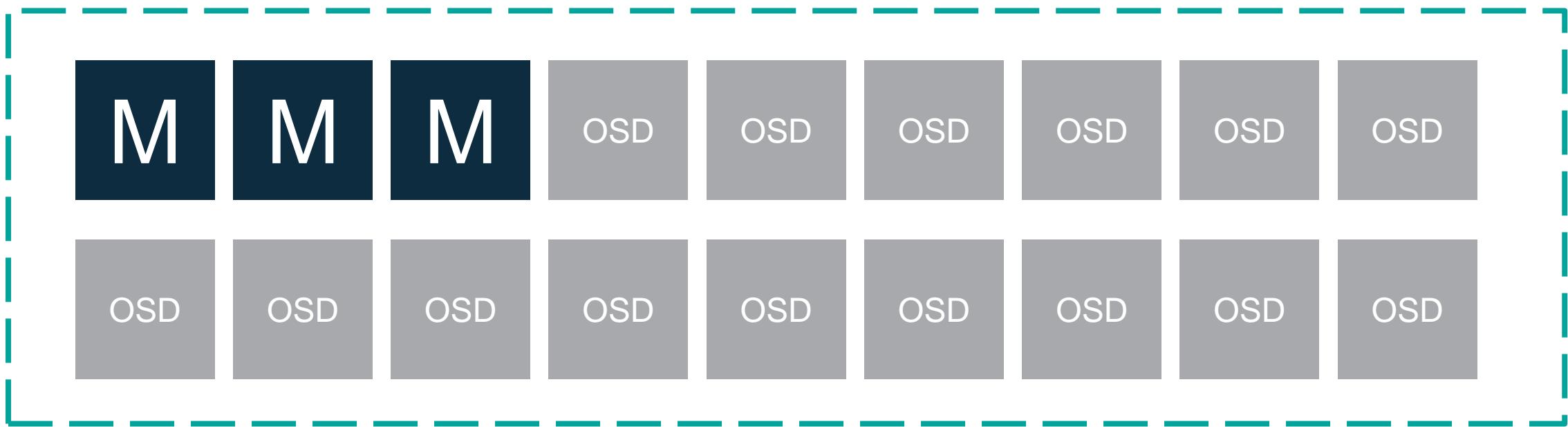
# RADOS Cluster

Reliable Autonomous Distributed Object Store



# RADOS Cluster

Reliable Autonomous Distributed Object Store



# RADOS Cluster

Reliable Autonomous Distributed Object Store

R A D O S

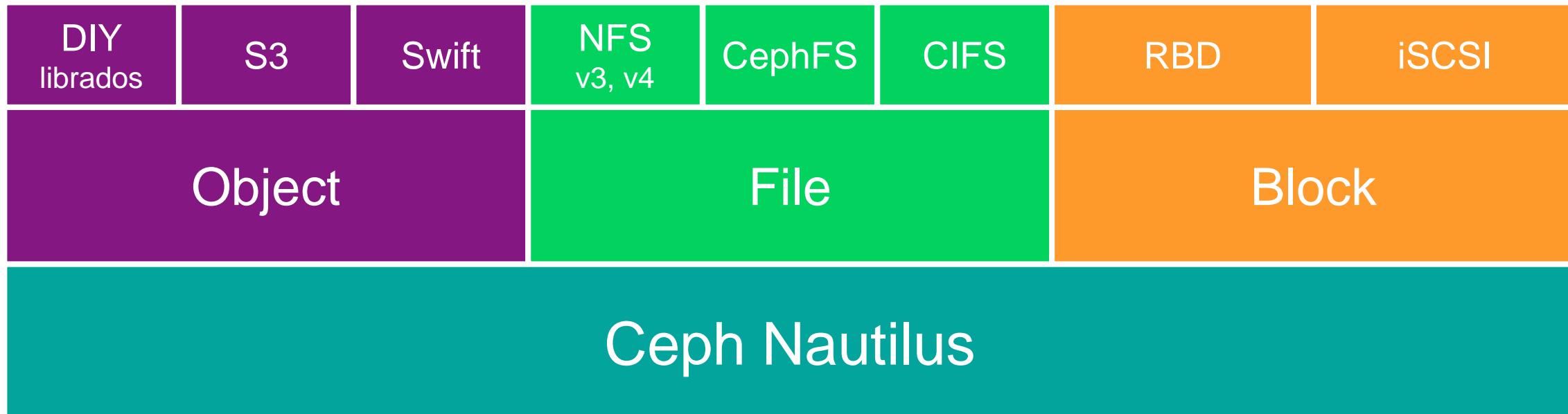
# SUSE Enterprise Storage

What's the difference with core Ceph?

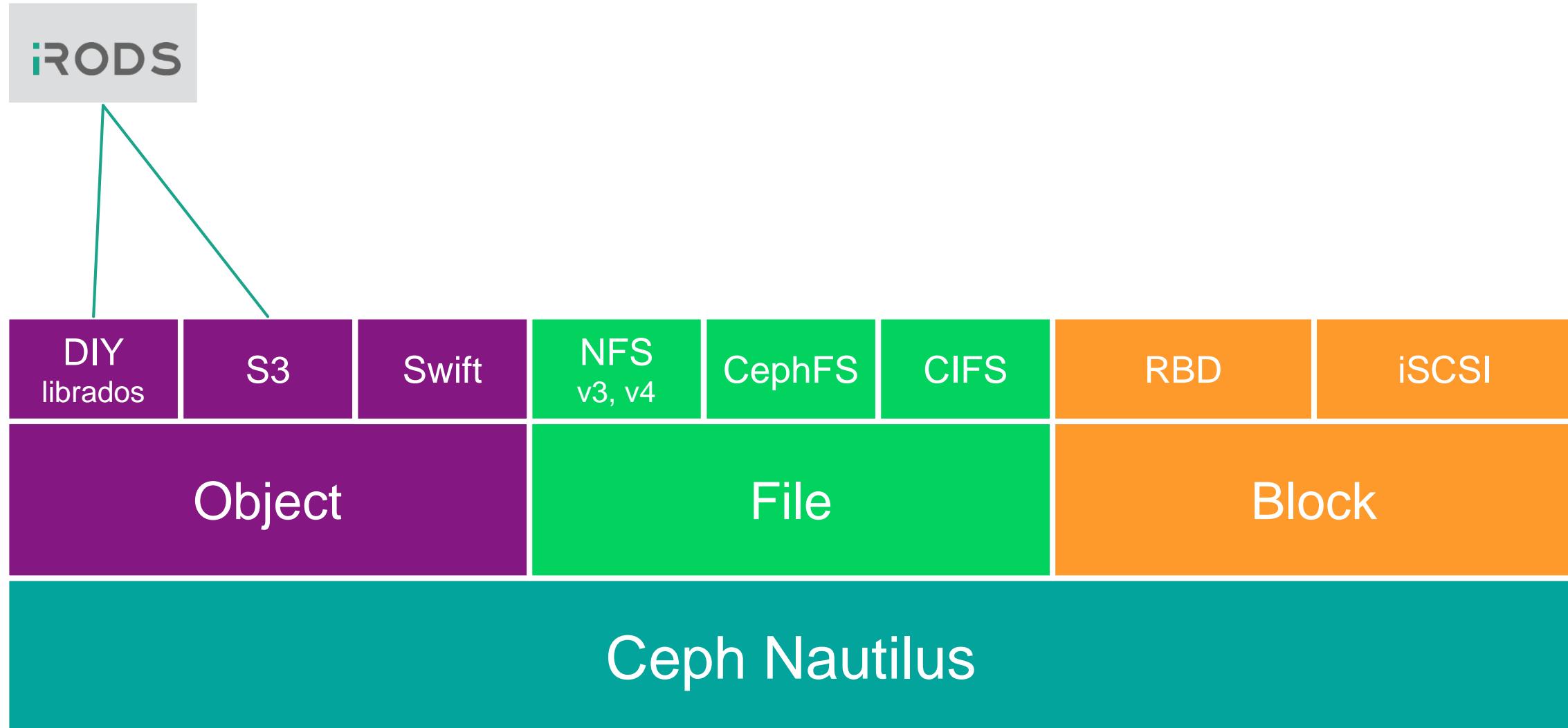
# SUSE Enterprise Storage 6

Ceph Nautilus

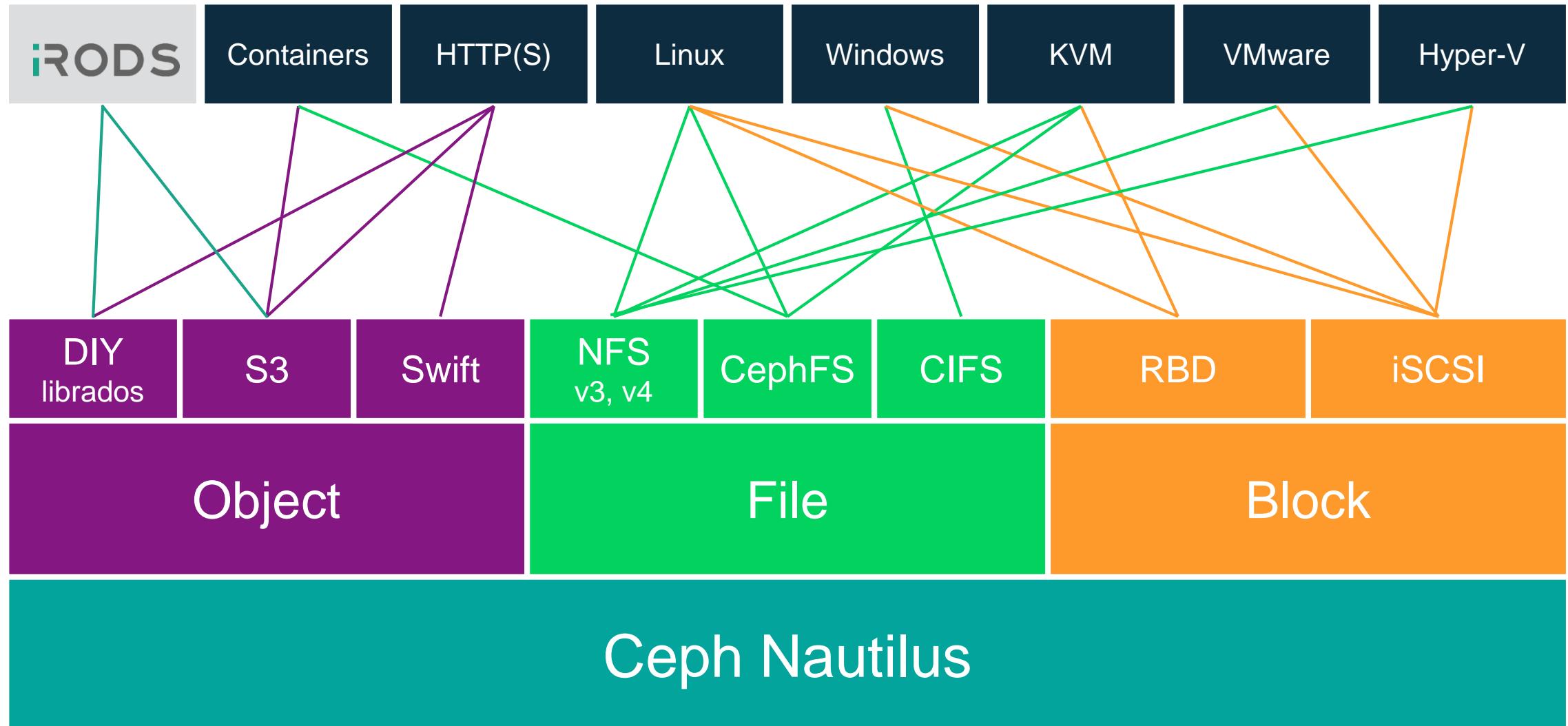
# SUSE Enterprise Storage 6



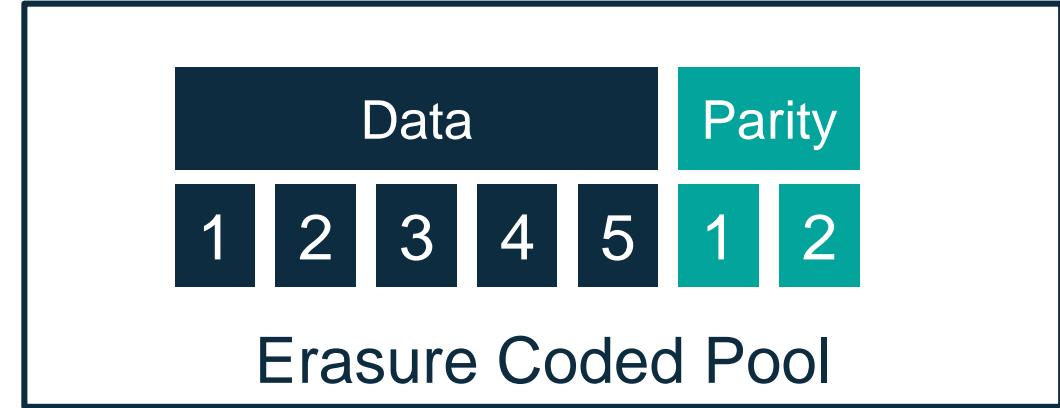
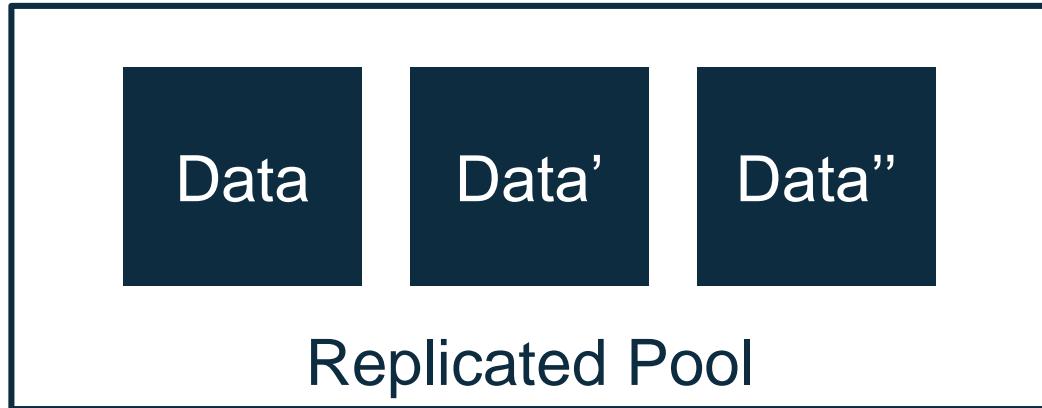
# SUSE Enterprise Storage 6



# SUSE Enterprise Storage 6



# Replication options



Full copies

Very high durability

3x overhead (200%)

Quicker recovery

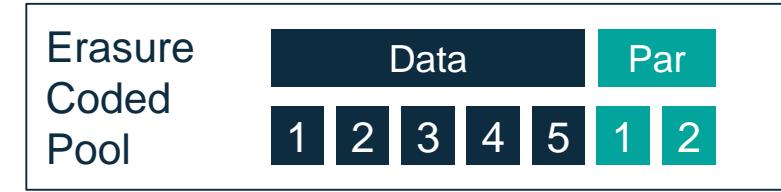
One copy plus parity

Cost-effective durability

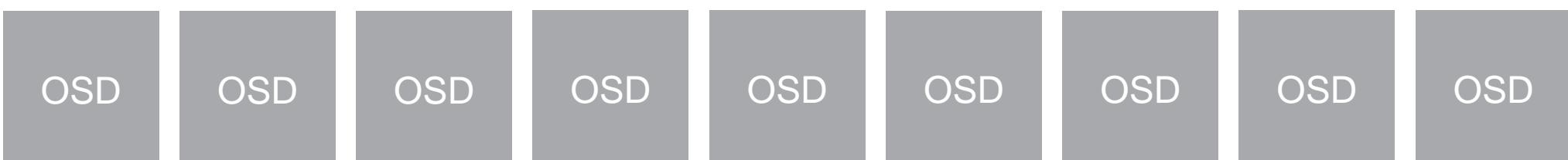
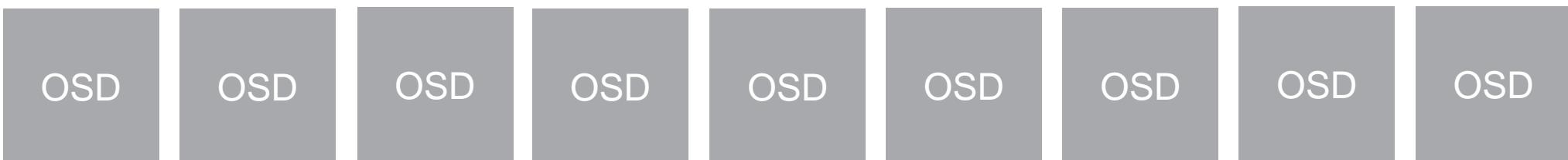
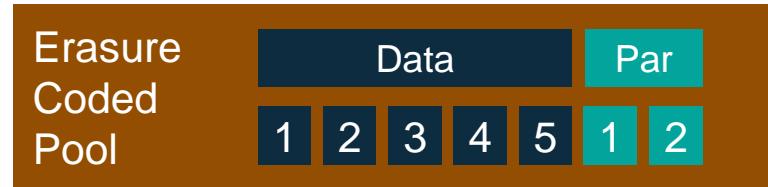
1.4x overhead (40%)

Expensive recovery

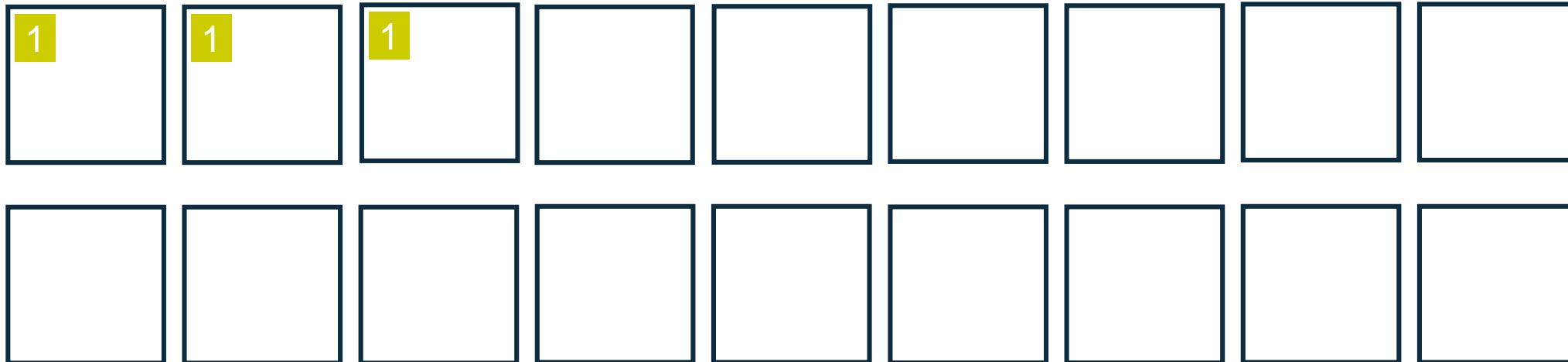
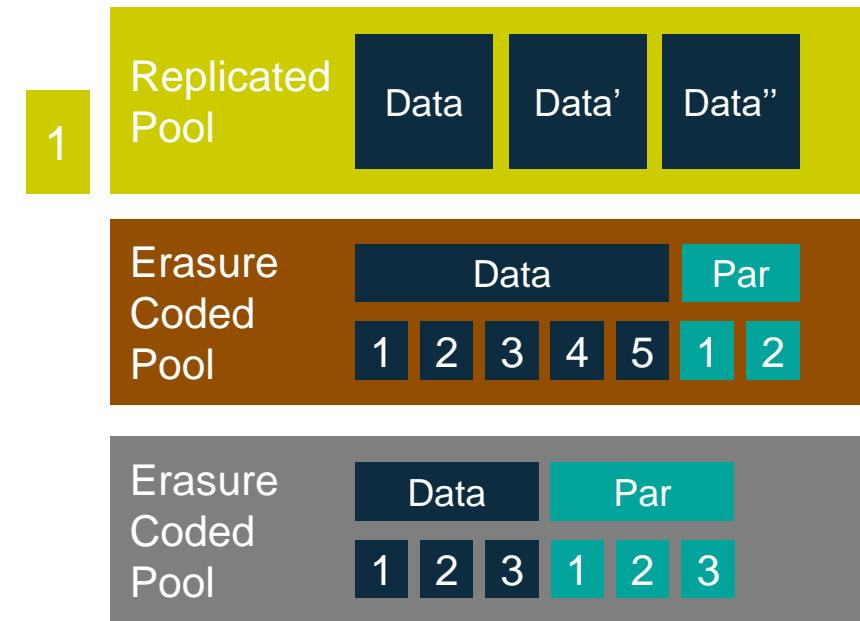
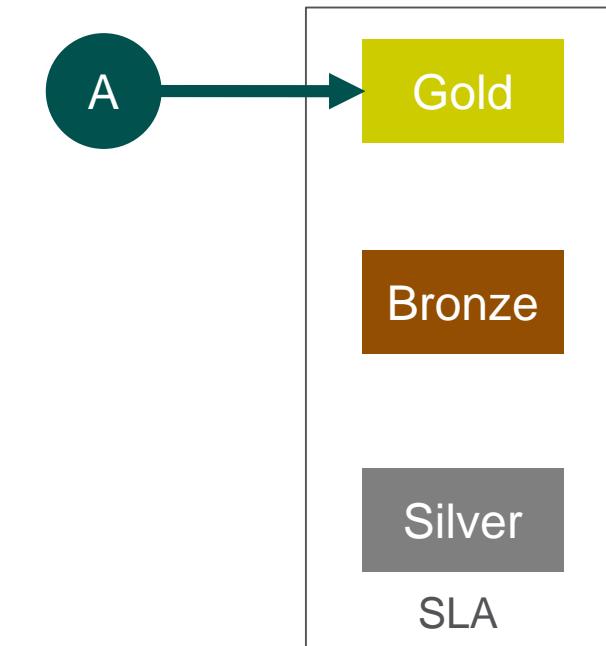
# Pools



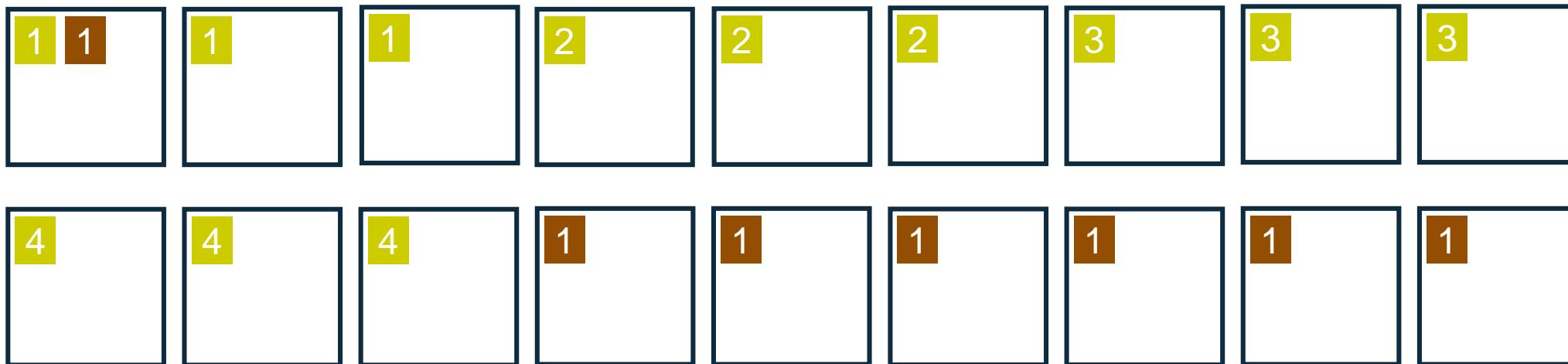
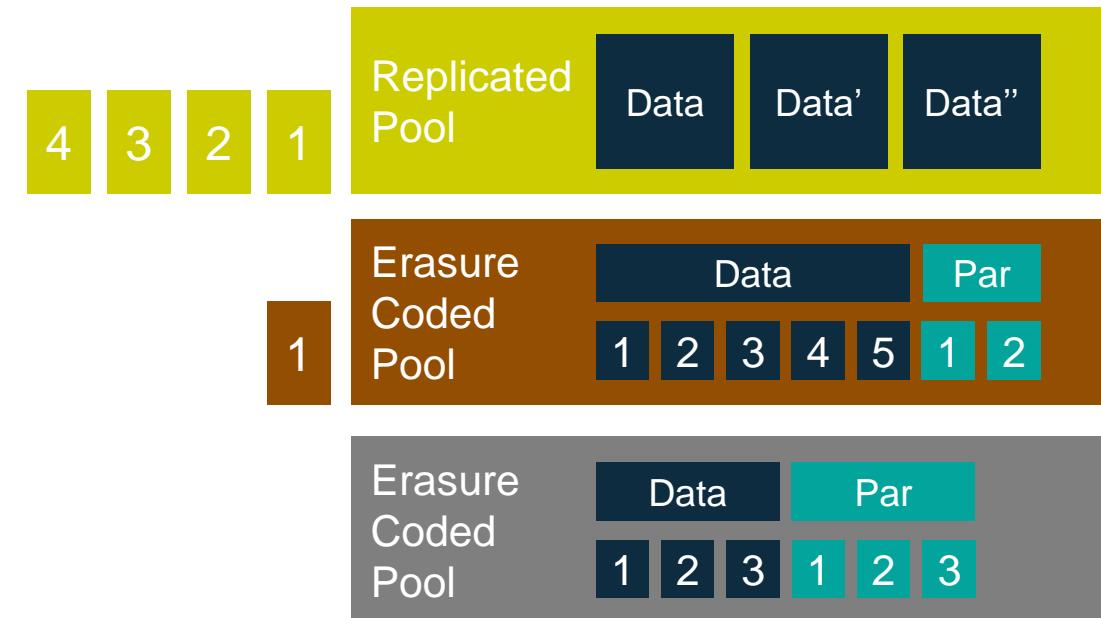
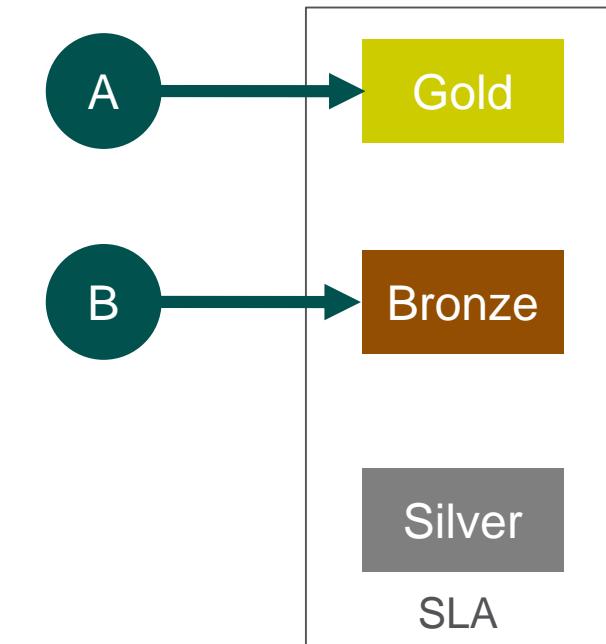
# Pools - SLA



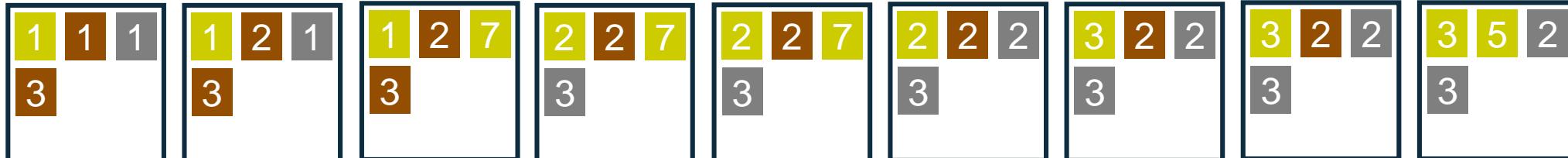
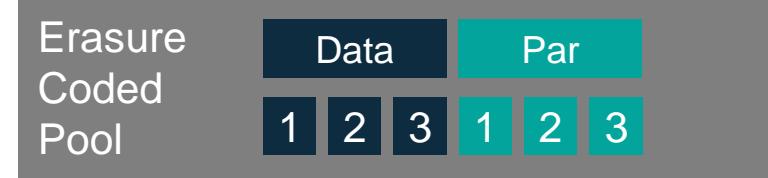
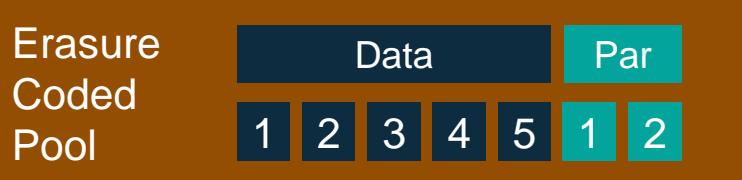
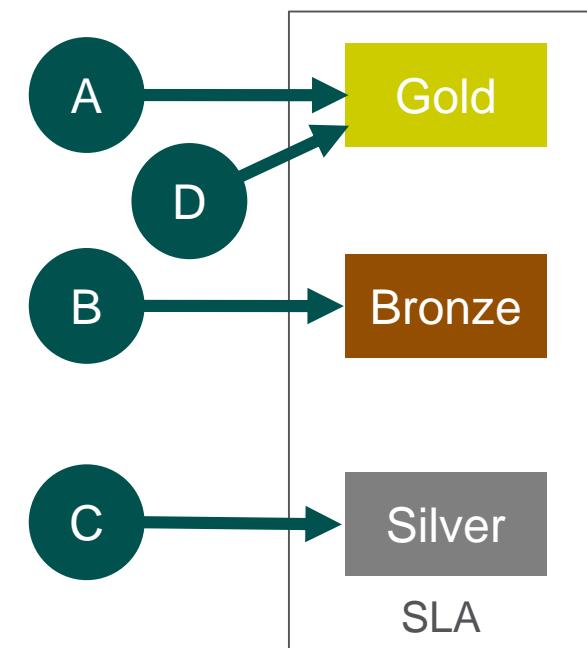
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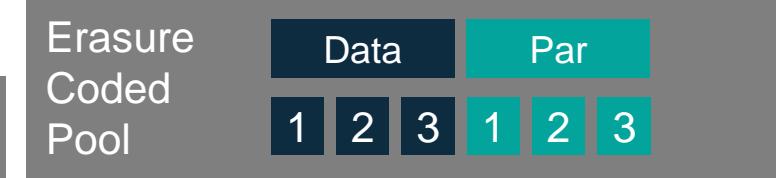
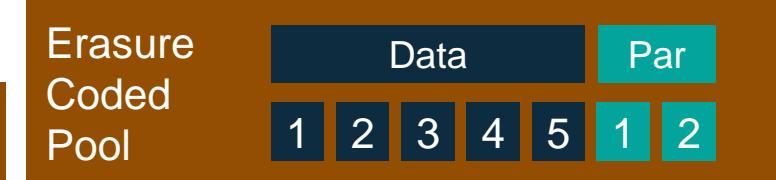
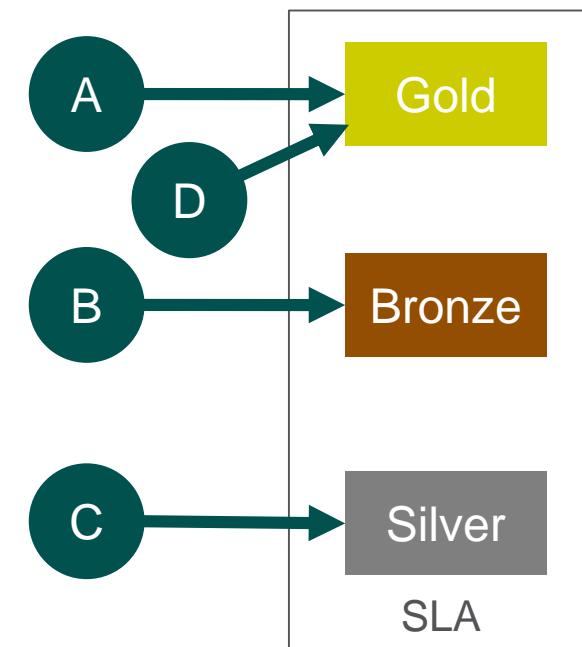
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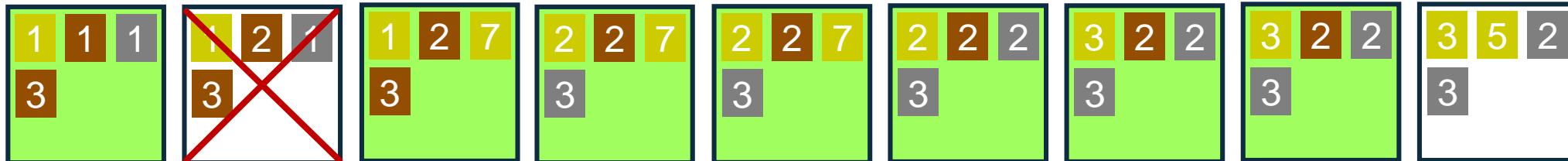
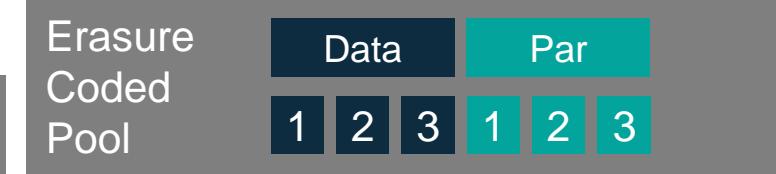
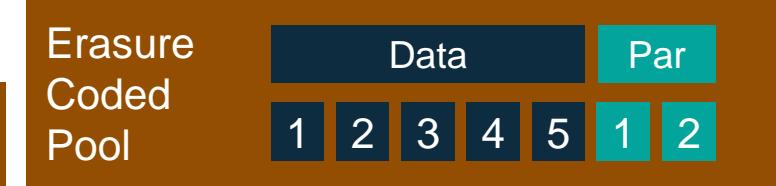
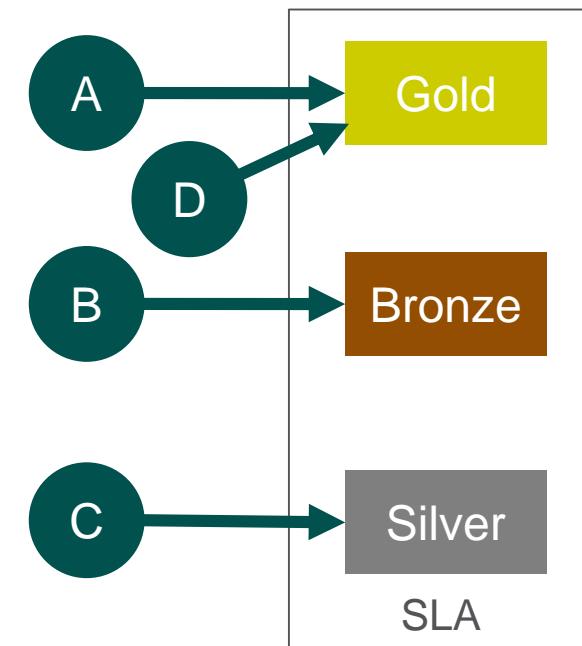
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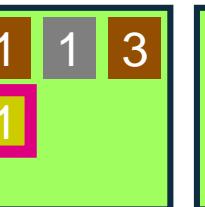
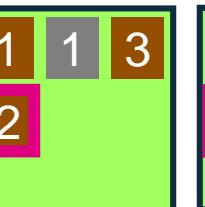
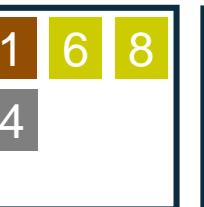
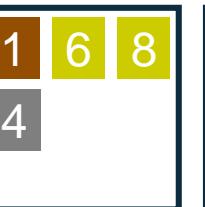
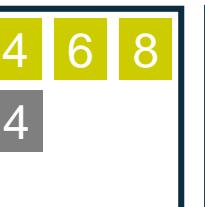
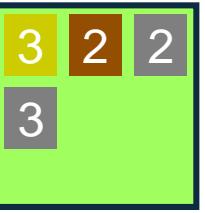
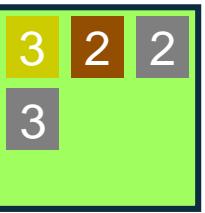
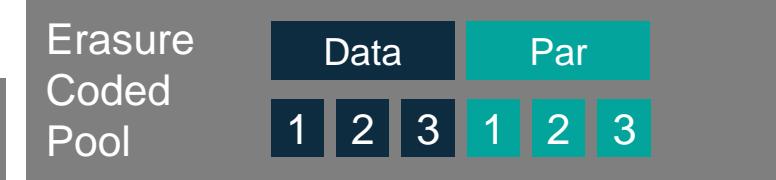
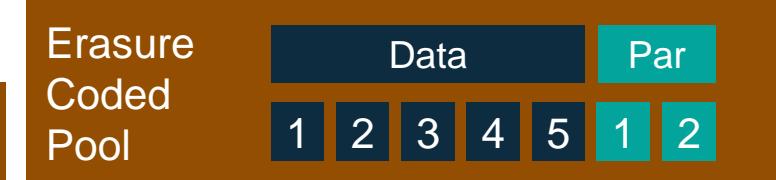
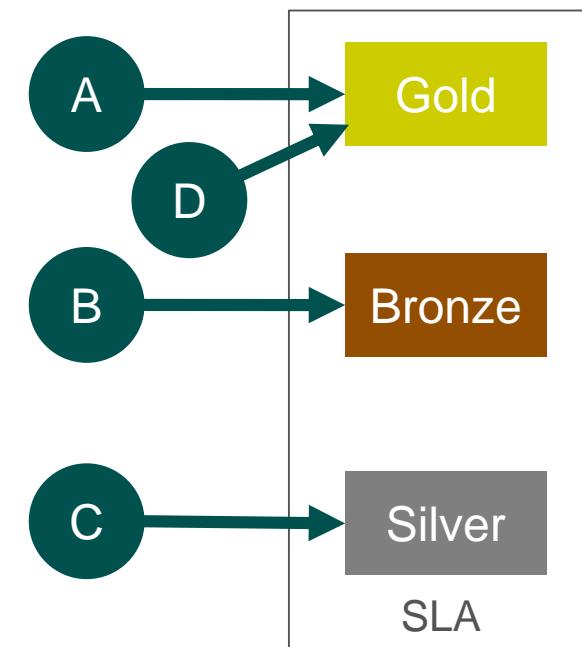
# Pools – Failure Domain



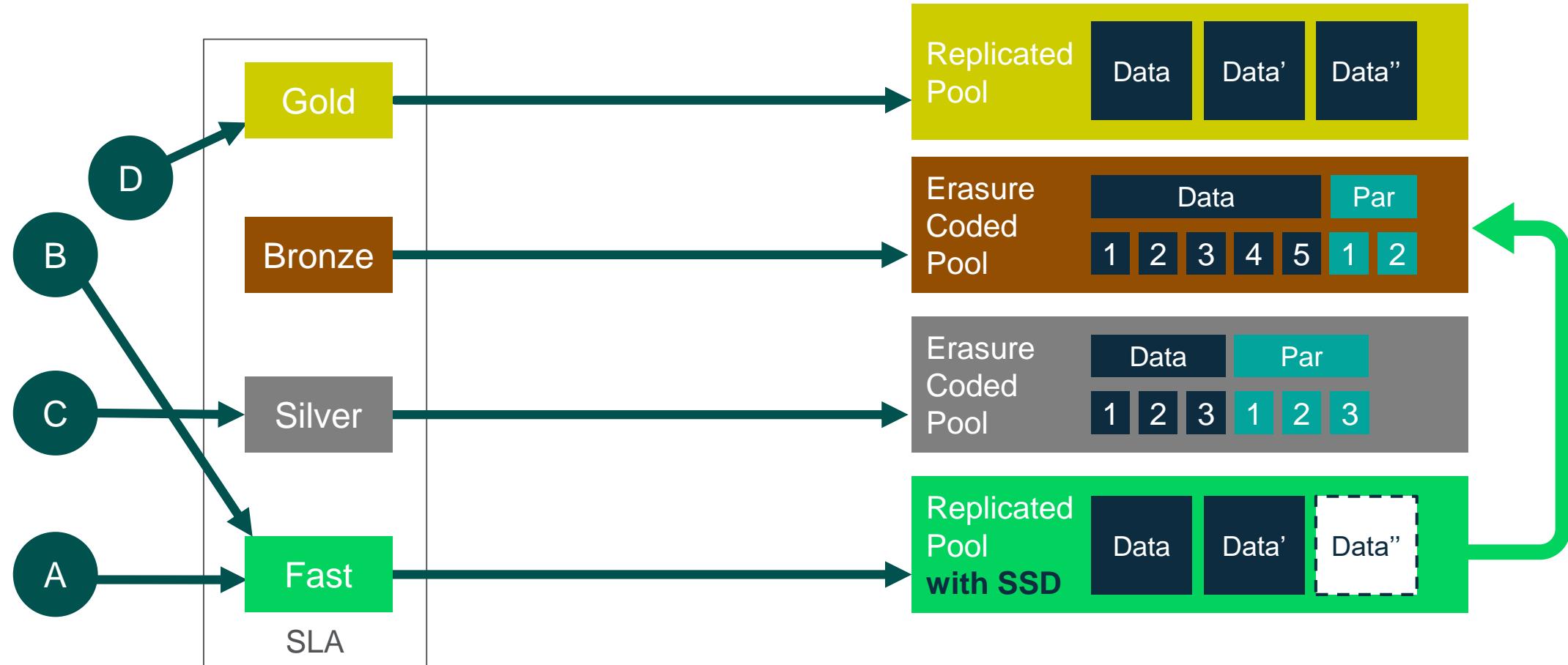
# Pools – Failure Domain



# Pools – Failure Domain



# Cache pool



# What Makes SUSE Enterprise Storage UNIQUE ?!

## OpenATTIC

- GUI based configuration and management
- Graphical performance and capacity metrics
- Ability to drill down to per node performance

## DeepSea

- Collection of SALT files for deploying SUSE Enterprise Storage
- 10 node or 10000 node fixed number of steps to deploy
- Deployment of Prometheus, Grafana and openATTIC

GLOBAL SEARCH IN PROGRESS...



# SUSE Enterprise Storage 6

## SUSE openATTIC Advanced Graphical Interface

SUSE Enterprise Storage

openattic English Notifications 1 Failed-Task API-Recorder Logout

Dashboard OSDs RBDs Pools Nodes iSCSI NFS Object Gateway CRUSH Map System

Ceph Pools

Users Buckets

+ Add

Name	ID	Used	Applications	Placement groups	Replica size	Erasure code profile	Type	Crush ruleset	Compression mode
.rgw.root	1	0.00%	rgw	8					
cephfs_data	6	0.00%	cephfs	128					
cephfs_metadata	7	0.00%	cephfs	128					
default.rgw.buckets.index	28	0.00%	rgw	8					
default.rgw.control	2	0.00%	rgw	8					
default.rgw.log	4	0.00%	rgw	8					
default.rgw.meta	3	0.00%	rgw	8					
iscsi-images	5	0.00%	rbd	128					
vmwarecert	9	0.08%	rbd	4096					
vmwaretest	8	0.88%	rbd	2048					

Showing 1 to 10 of 10 items

SUSE Enterprise Storage

Dashboard OSDs RBDs Pools Nodes iSCSI NFS Object Gateway CRUSH Map System

Last 12 hours Refresh every 30s

Health Status Monitors In Quorum Pools Cluster Capacity Used Capacity Available Capacity

OK 3 13 796 TiB 15.36 TiB 98.1%

OSDs IN OSDs OUT OSDs UP OSDs DOWN Average PGs per OSD Average OSD Apply Latency Average OSD Commit Latency Average Monitor Latency

147 0 147 0 134 104.7 µs 104.7 µs 0 s

Capacity IOPS Throughput

800 TiB 796 TiB 791 TiB 787 TiB 782 TiB

22:00 00:00 02:00 04:00 06:00 08:00

min max avg current

Available 780.32 TiB 780.32 TiB 780.32 TiB 780.32 TiB

Used 15.36 TiB 15.36 TiB 15.36 TiB 15.36 TiB

Total Capacity 795.69 TiB 795.69 TiB 795.69 TiB 795.69 TiB

Write Read

min max avg current

0 Bps 0 Bps 0 Bps 0 Bps

77

# Deploy with DeepSea

```
# deepsea stage run ceph.stage.prep
# deepsea stage run ceph.stage.discovery
```

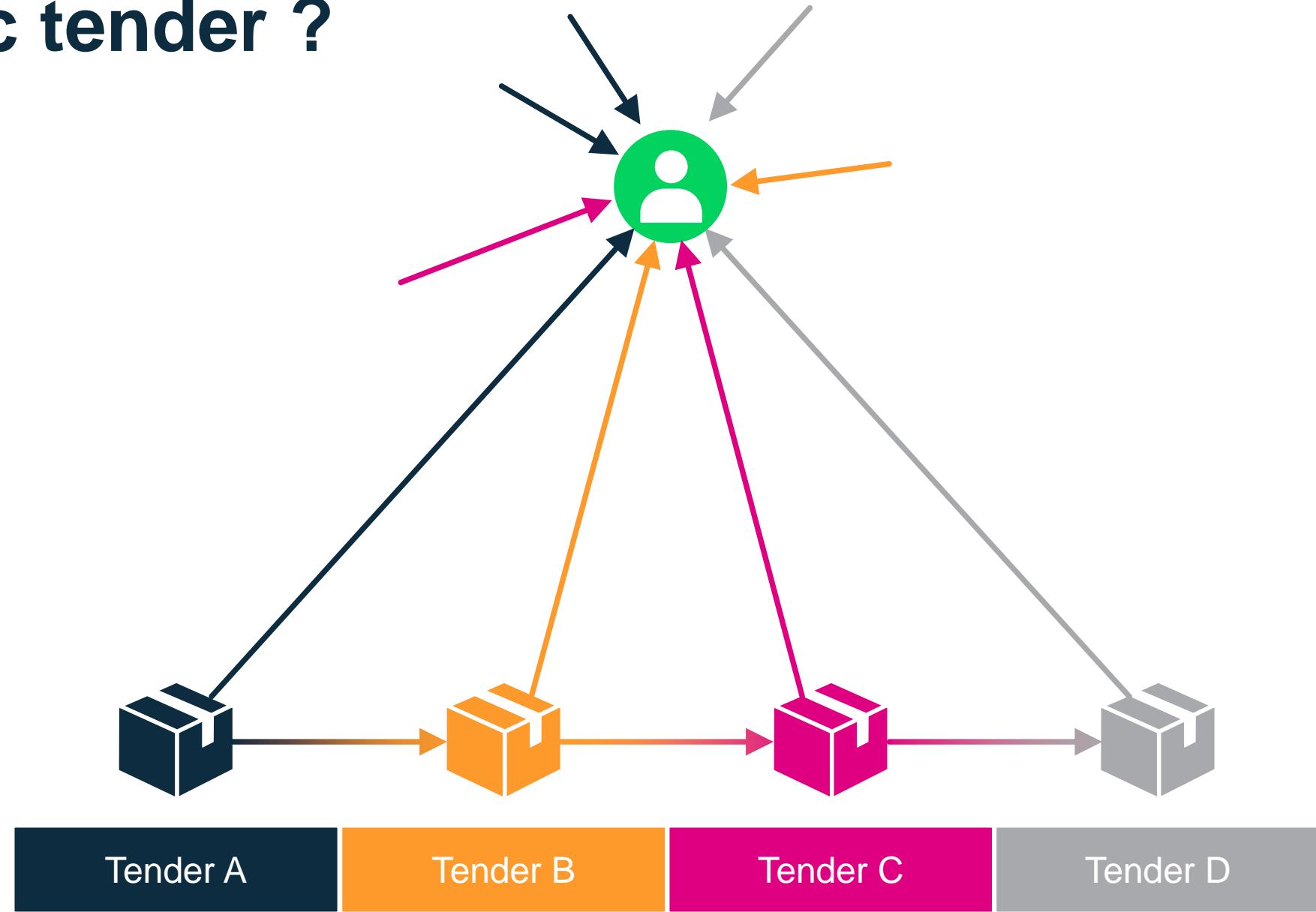
Edit proposal configuration file

```
# deepsea stage run ceph.stage.configure
# deepsea stage run ceph.stage.deploy
# deepsea stage run ceph.stage.service
```

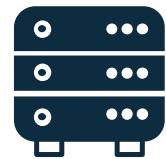
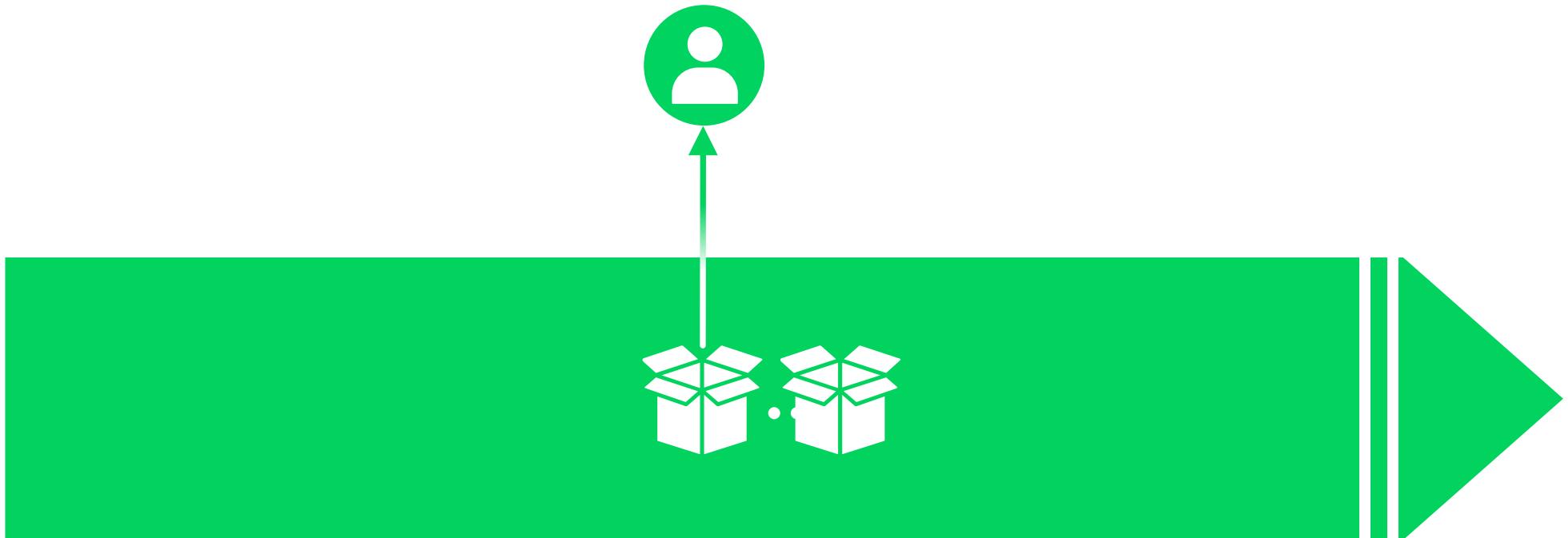
# SUSE

We Adapt. You Succeed.

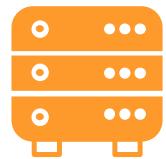
# Public tender ?



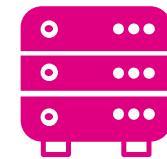
# Open, Flexible, Scalable Storage Solution



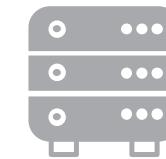
Tender A



Tender B

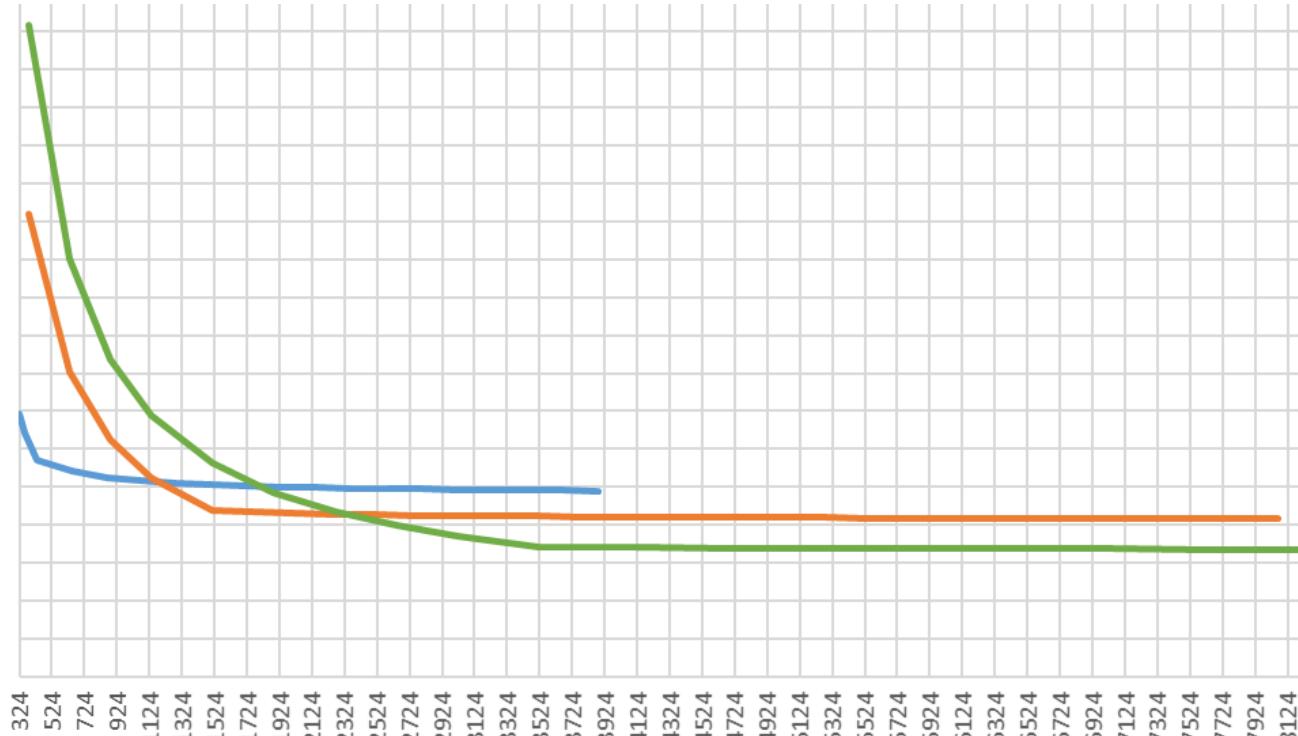


Tender C



Tender D

# Fit for purpose



Config 1 : Erasure Coding k=3, m=3	
OSD node	OSD-12
OSD disk (one)	12TB HDD

Config 2 : Erasure Coding k=7, m=5	
OSD node	OSD-12
OSD disk (one)	12TB HDD

Config 3 : Erasure Coding k=7, m=5	
OSD node	OSD-28
OSD disk (one)	12TB HDD

- TCO
- € / TB / Year
- HA vs DR
- Copies vs Erasure Coding
- Disk size
- Server type
- Spare capacity
- Future expansion

# Training

- ✓ On the job
- ✓ Classroom
- ✓ Online
- ✓ Read The **Fine** Manual

# Support



**24x7 SUSE Priority Support**

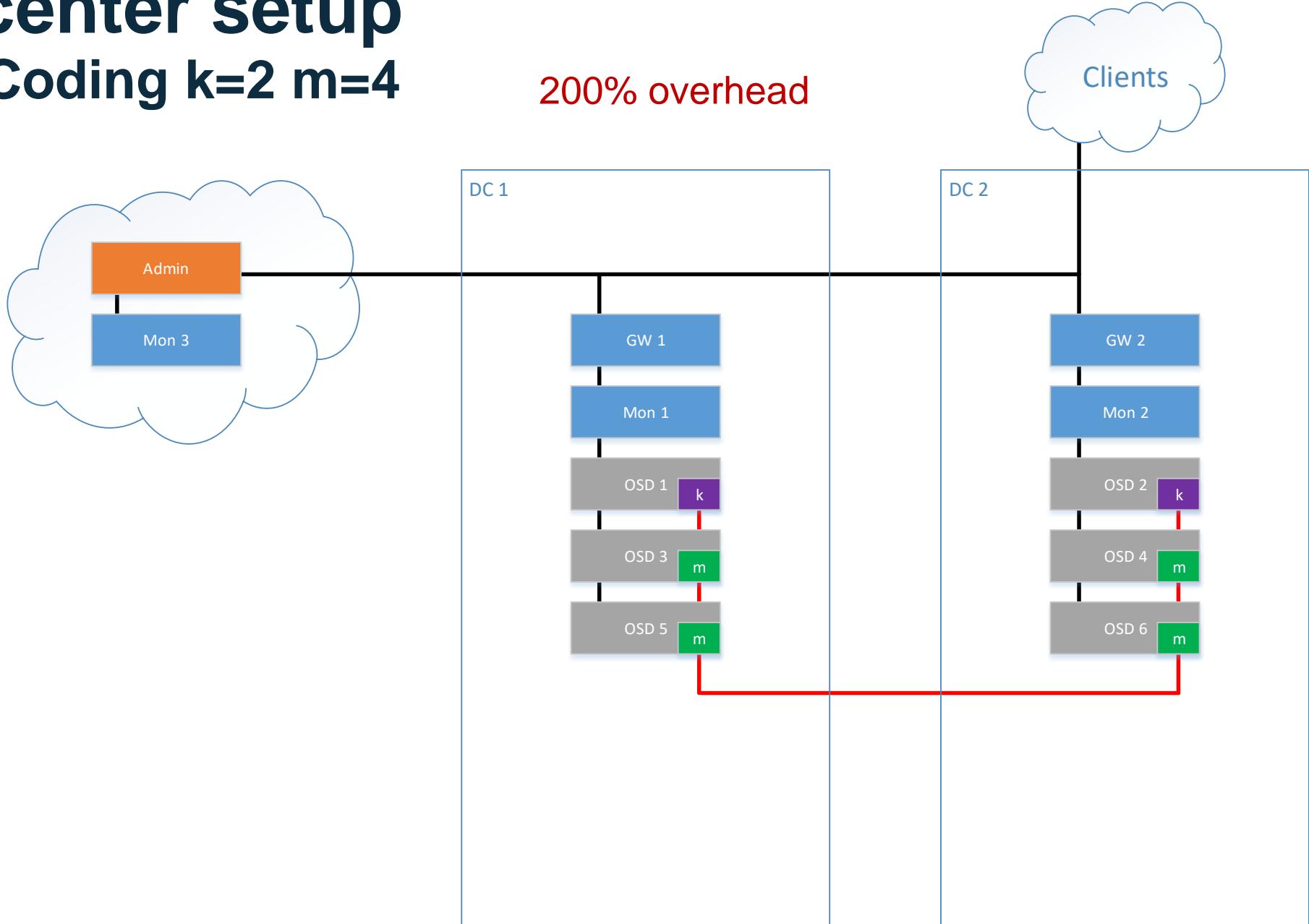


# Cluster scenario's

# 2 datacenter setup

Erasure Coding  $k=2$   $m=4$

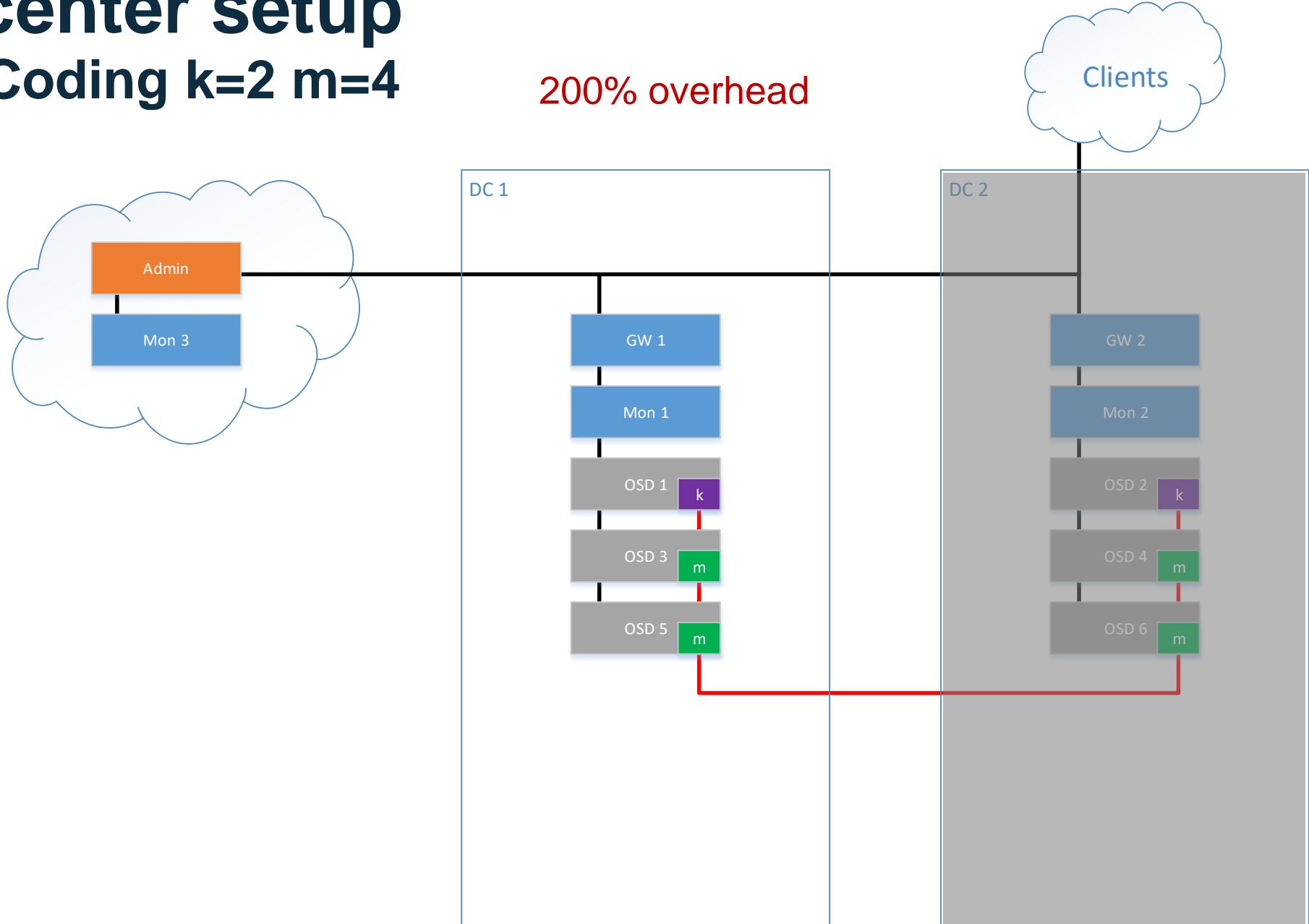
200% overhead



# 2 datacenter setup

## Erasure Coding k=2 m=4

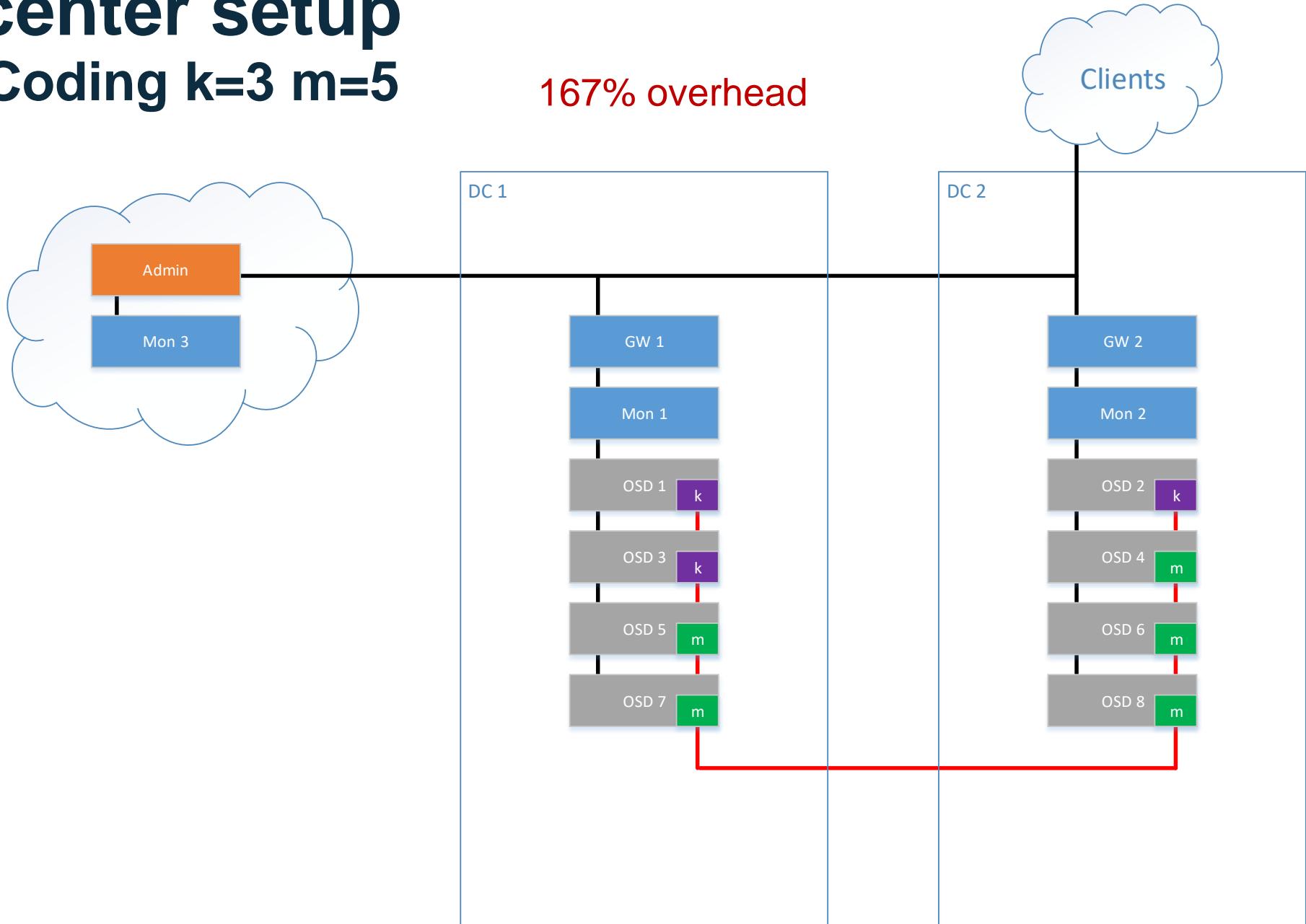
200% overhead



# 2 datacenter setup

## Erasure Coding k=3 m=5

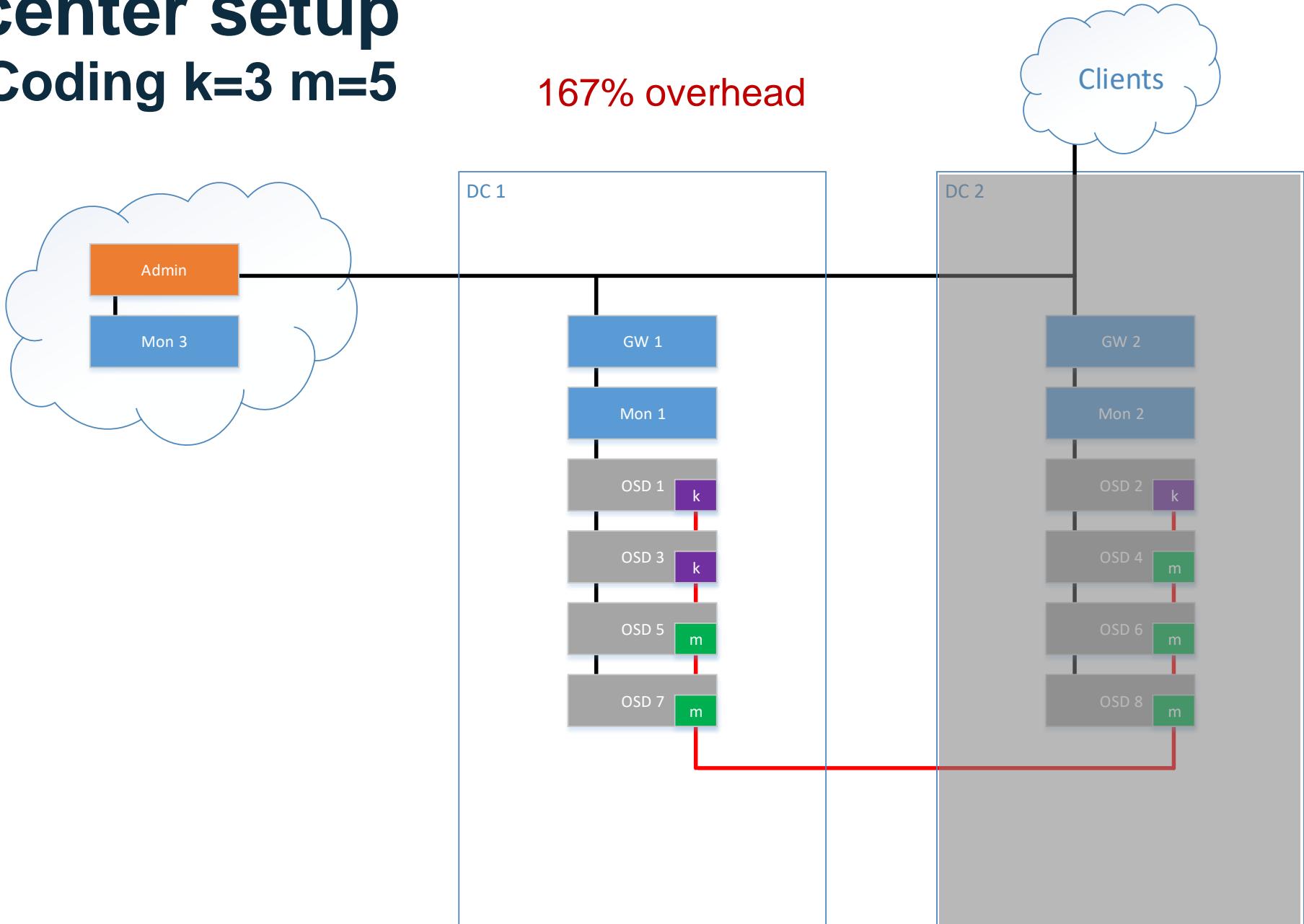
167% overhead



# 2 datacenter setup

## Erasure Coding k=3 m=5

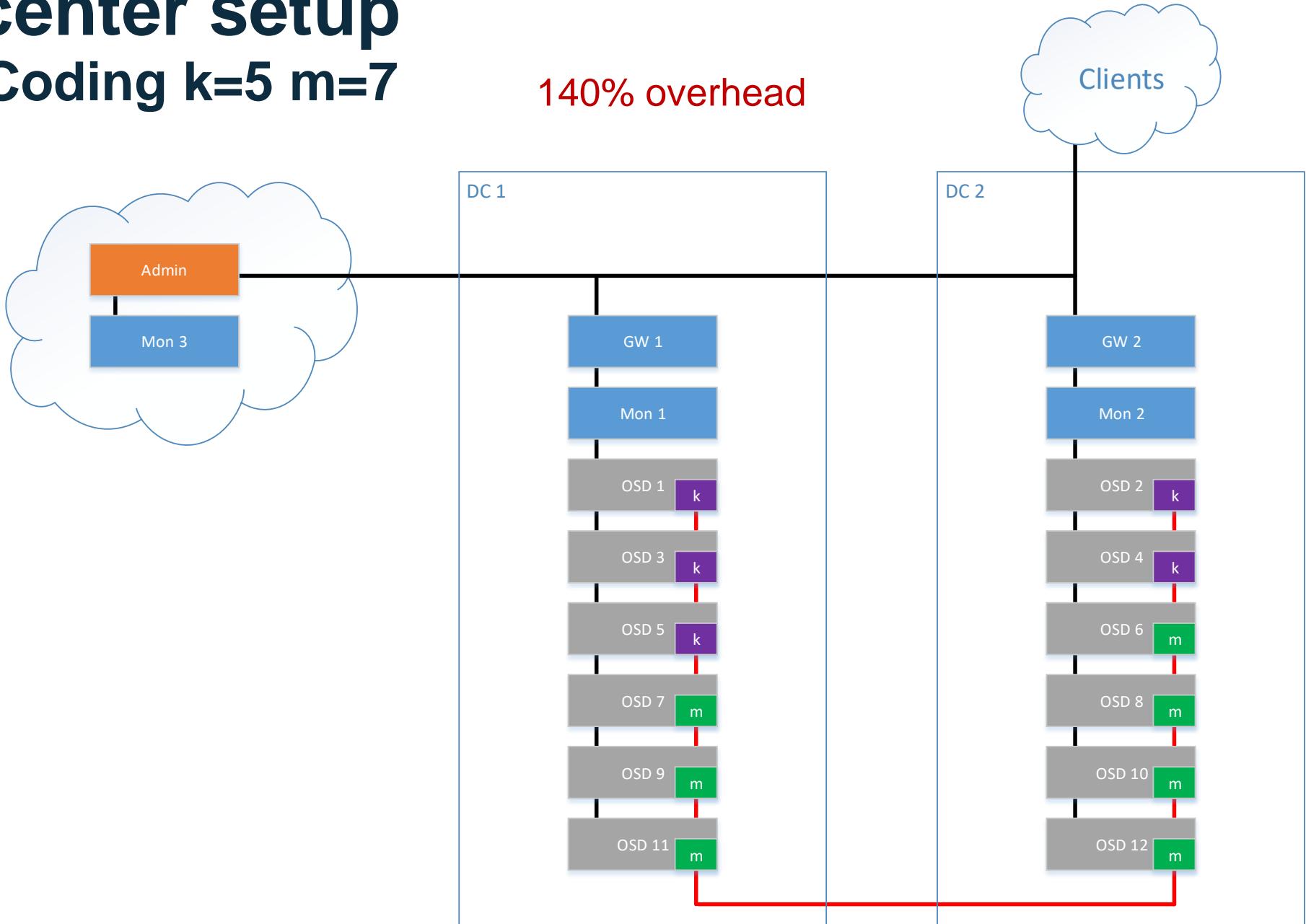
167% overhead



# 2 datacenter setup

## Erasure Coding k=5 m=7

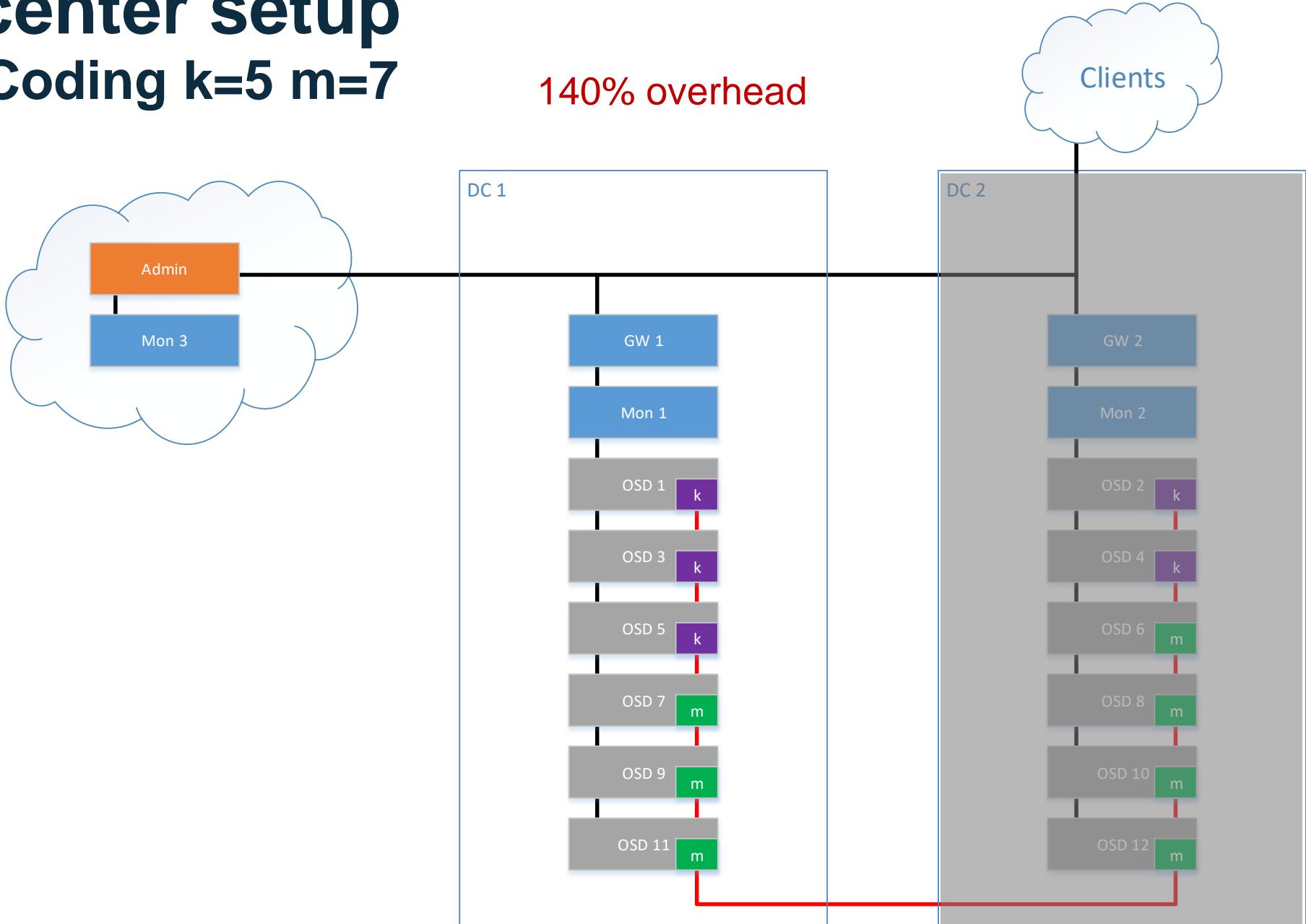
140% overhead



# 2 datacenter setup

## Erasure Coding k=5 m=7

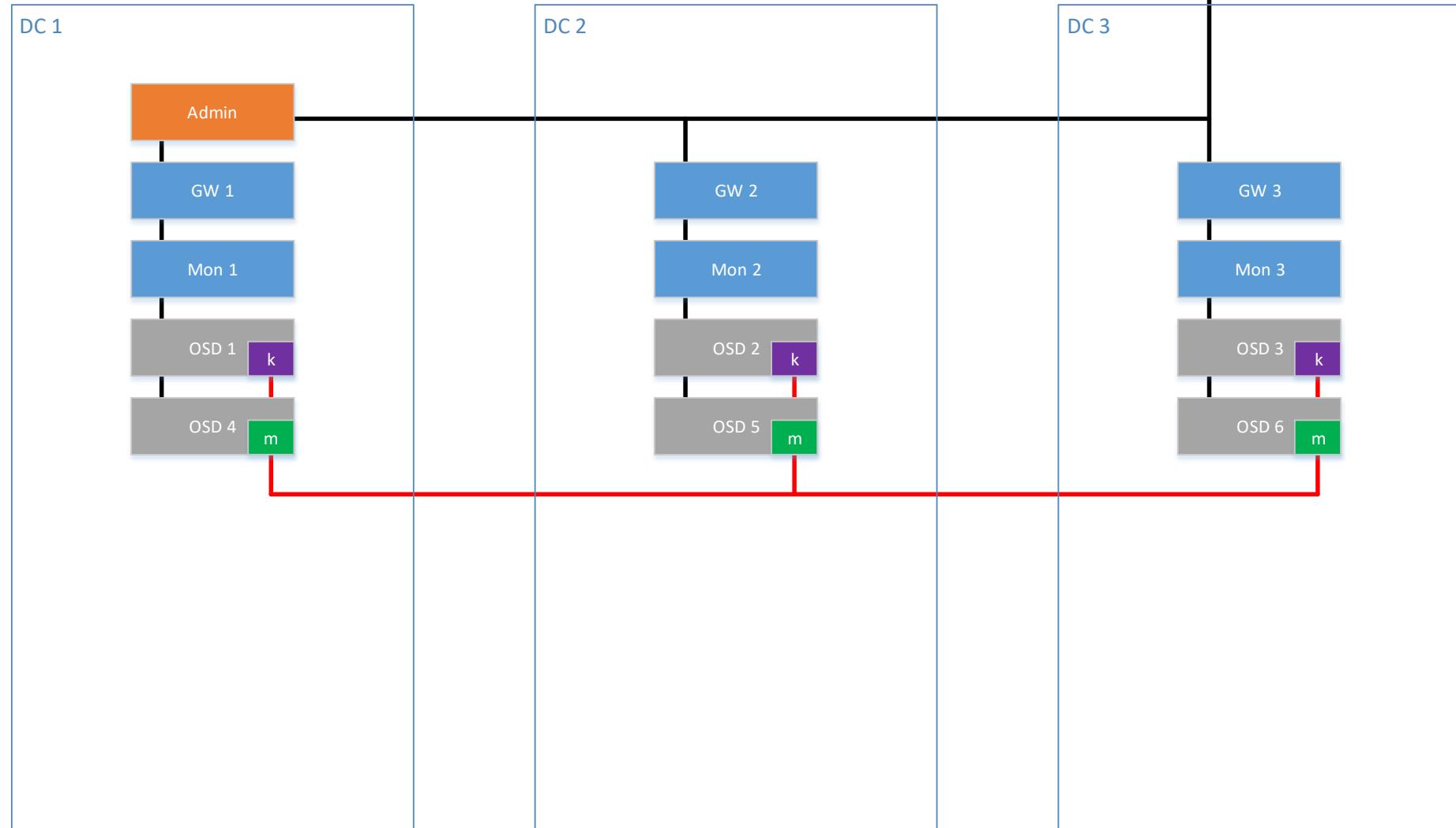
140% overhead



# 3 datacenter setup

Erasure Coding  $k=3$   $m=3$

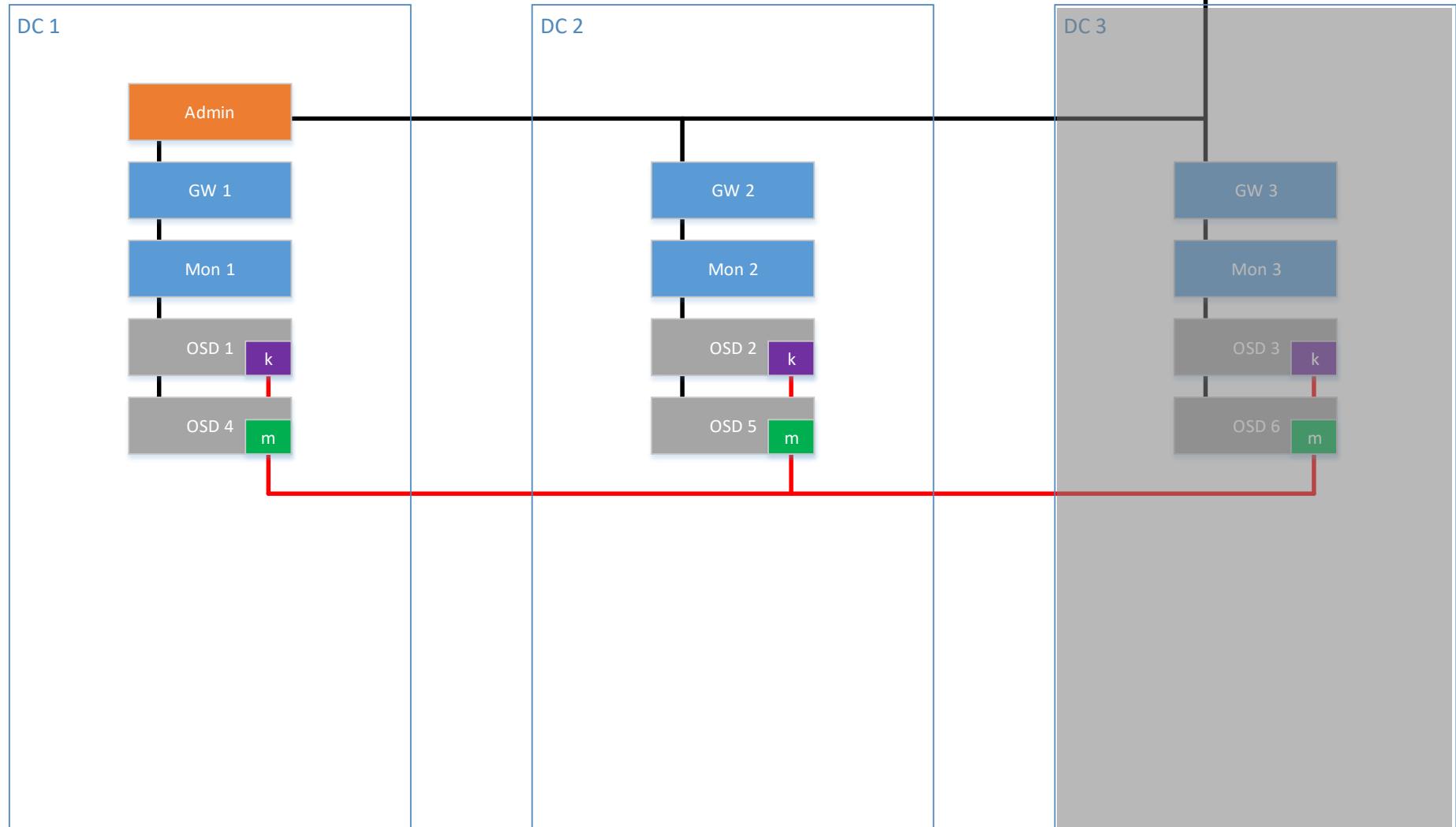
100% overhead



# 3 datacenter setup

Erasure Coding  $k=3$   $m=3$

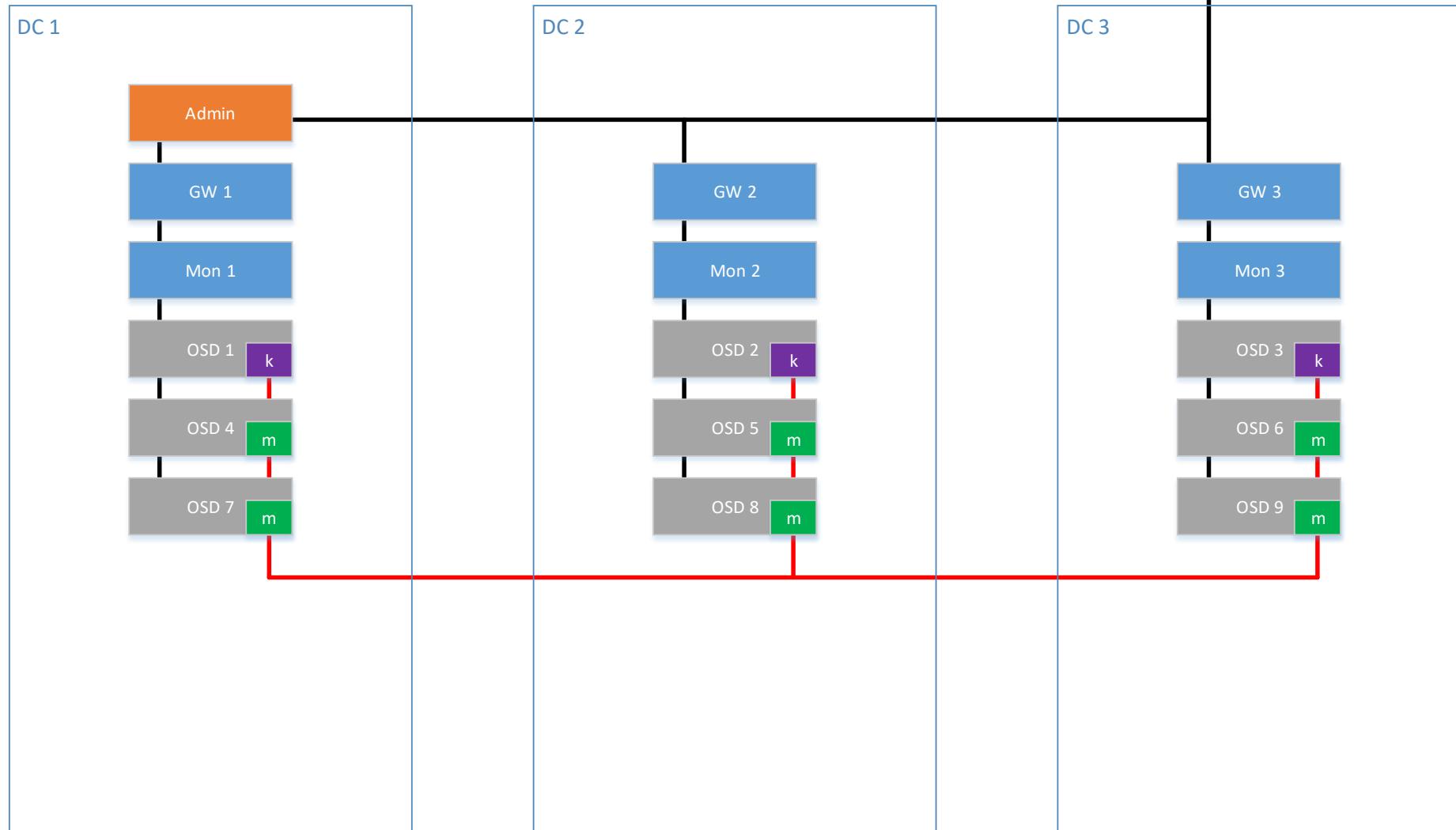
100% overhead



# 3 datacenter setup

## Erasure Coding k=3 m=6

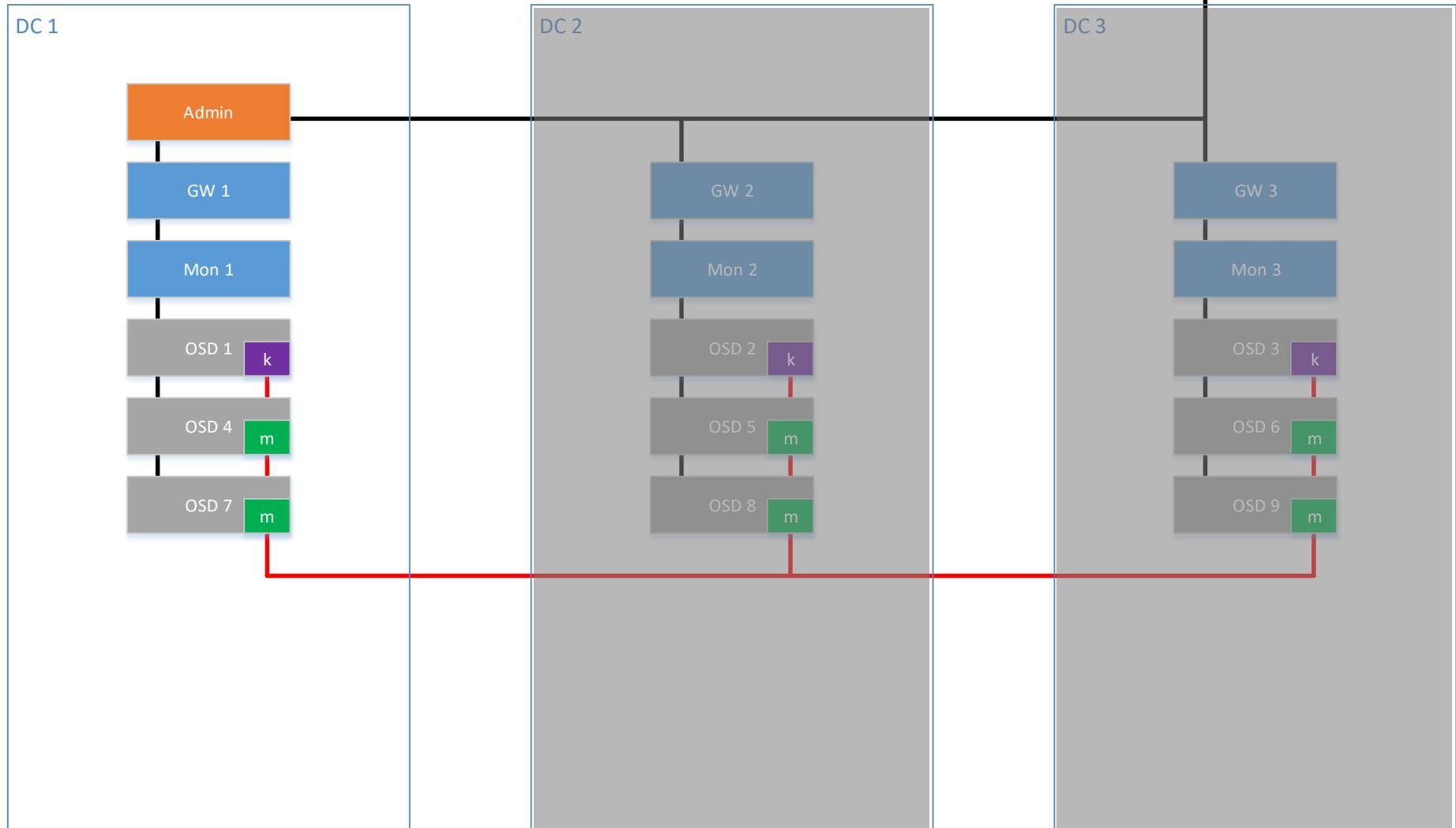
200% overhead



# 3 datacenter setup

## Erasure Coding k=3 m=6

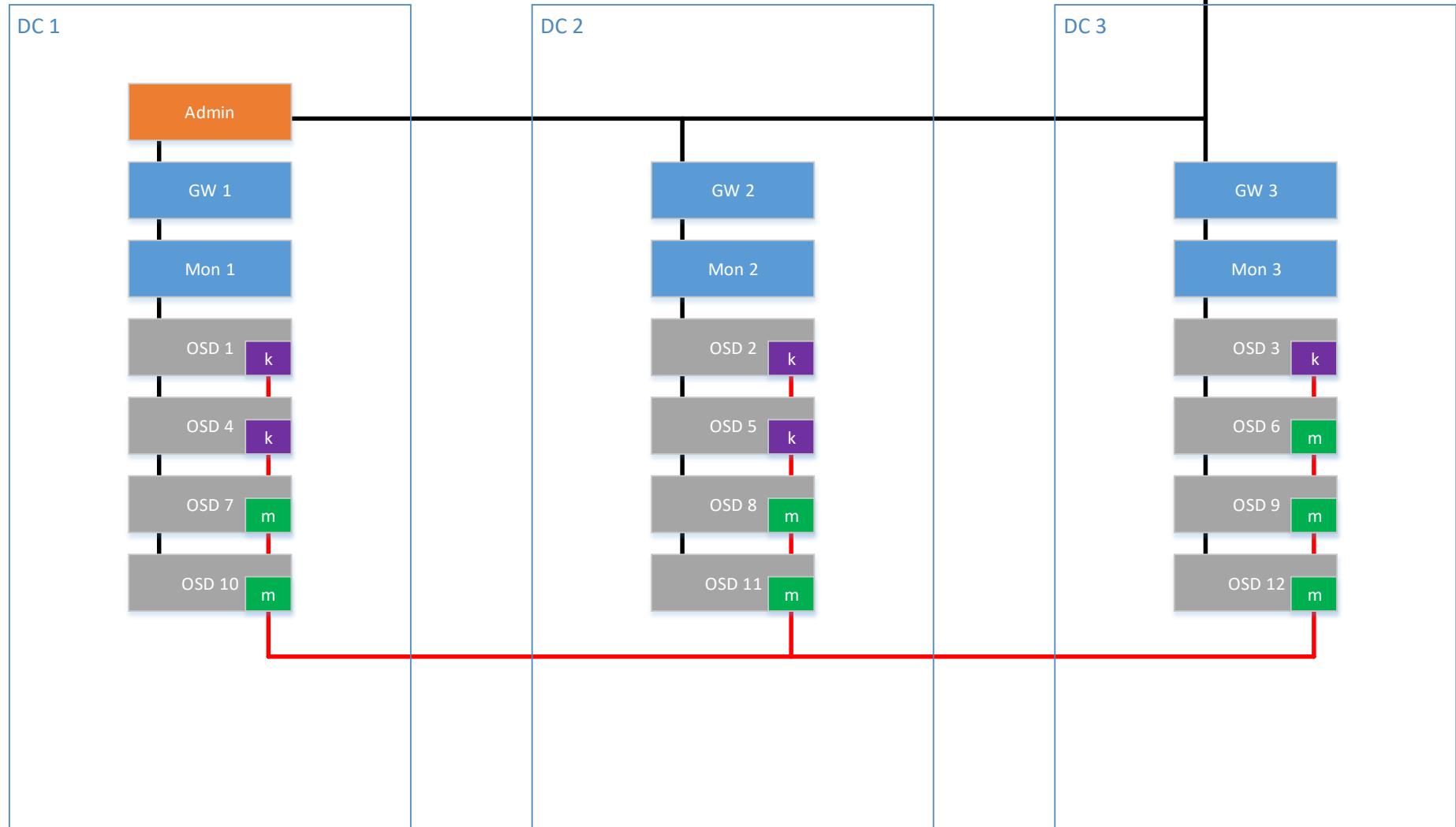
200% overhead



# 3 datacenter setup

Erasure Coding k=5 m=7

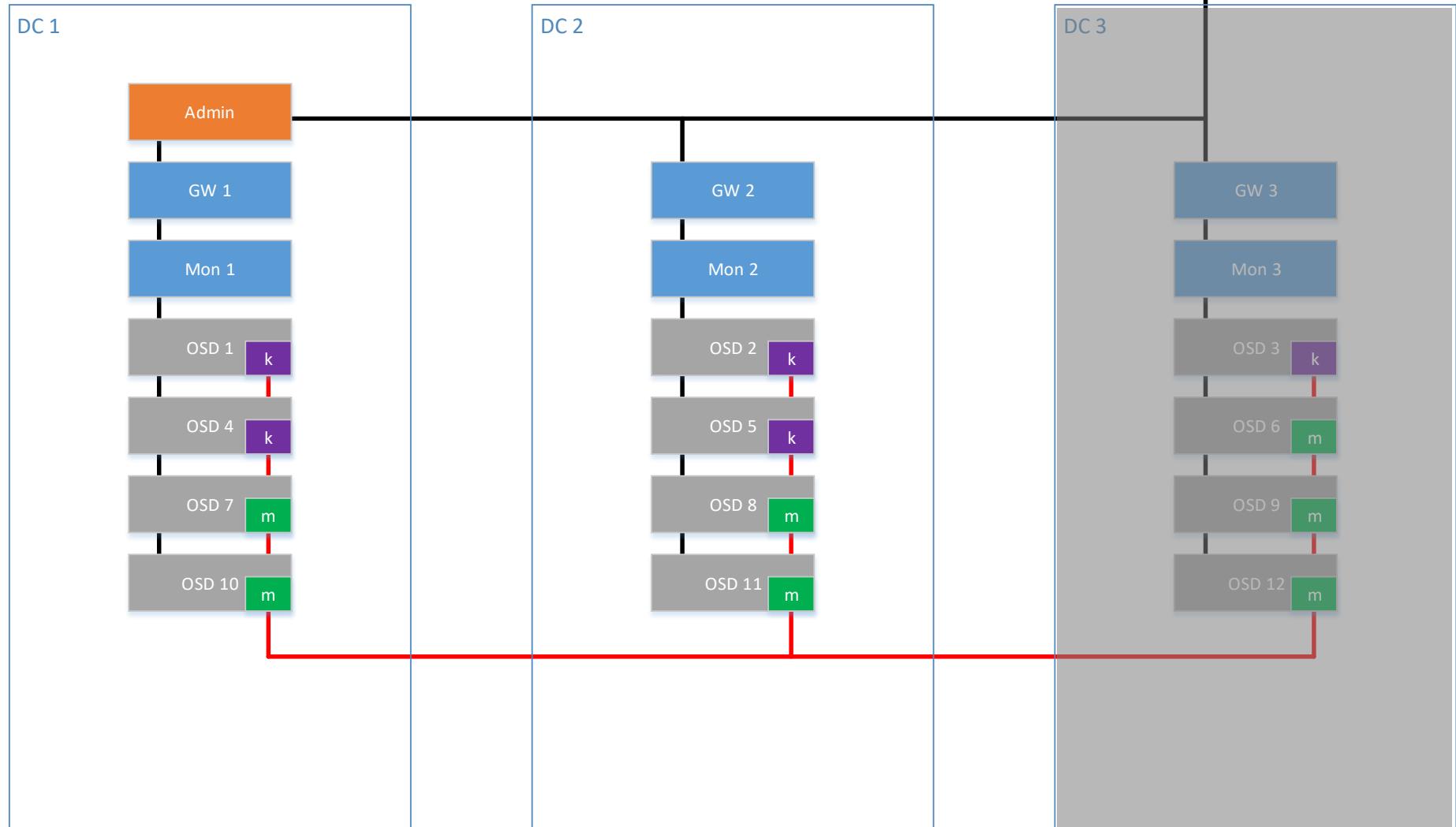
140% overhead



# 3 datacenter setup

Erasure Coding k=5 m=7

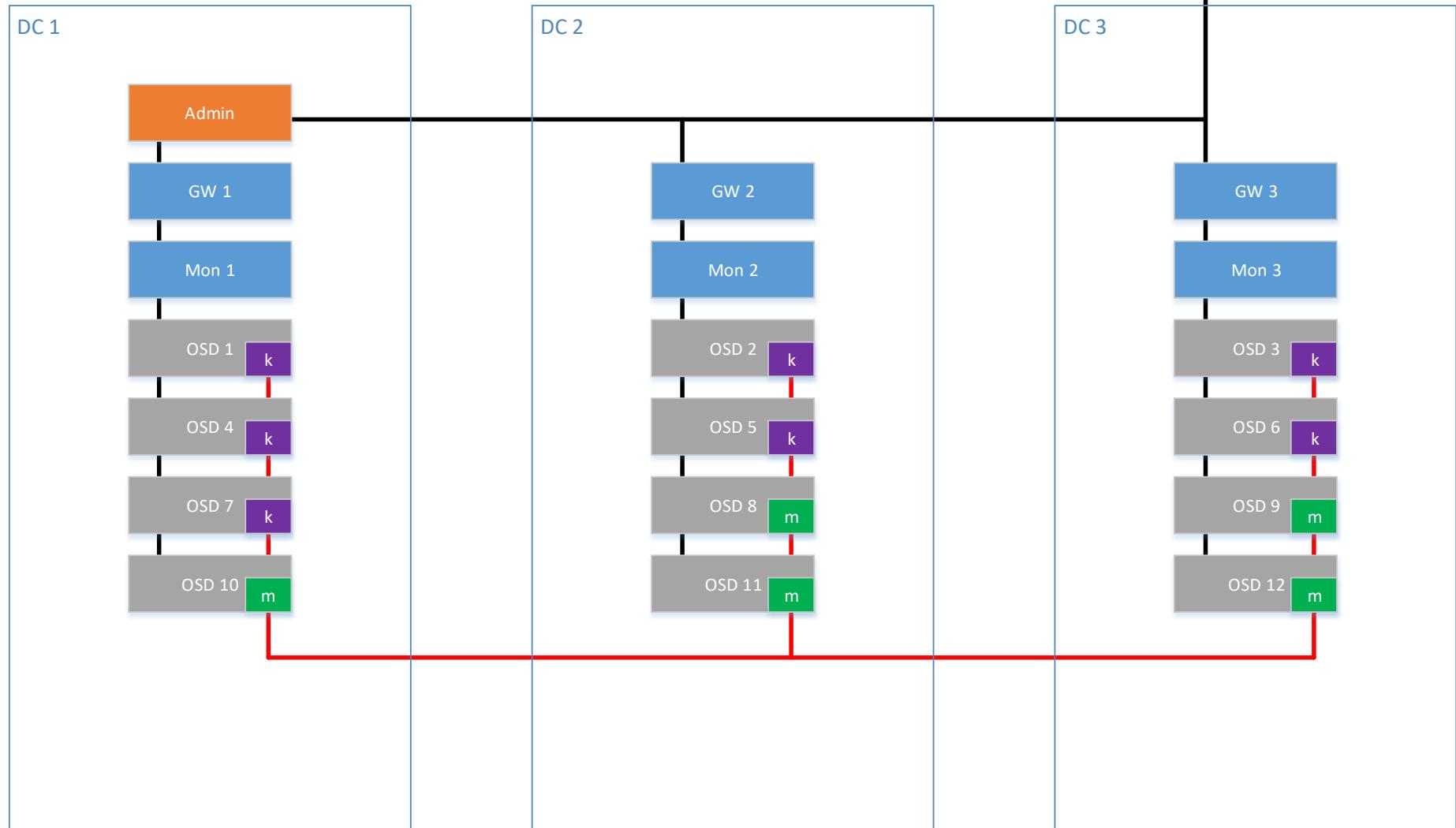
140% overhead



# 3 datacenter setup

## Erasure Coding k=7 m=5

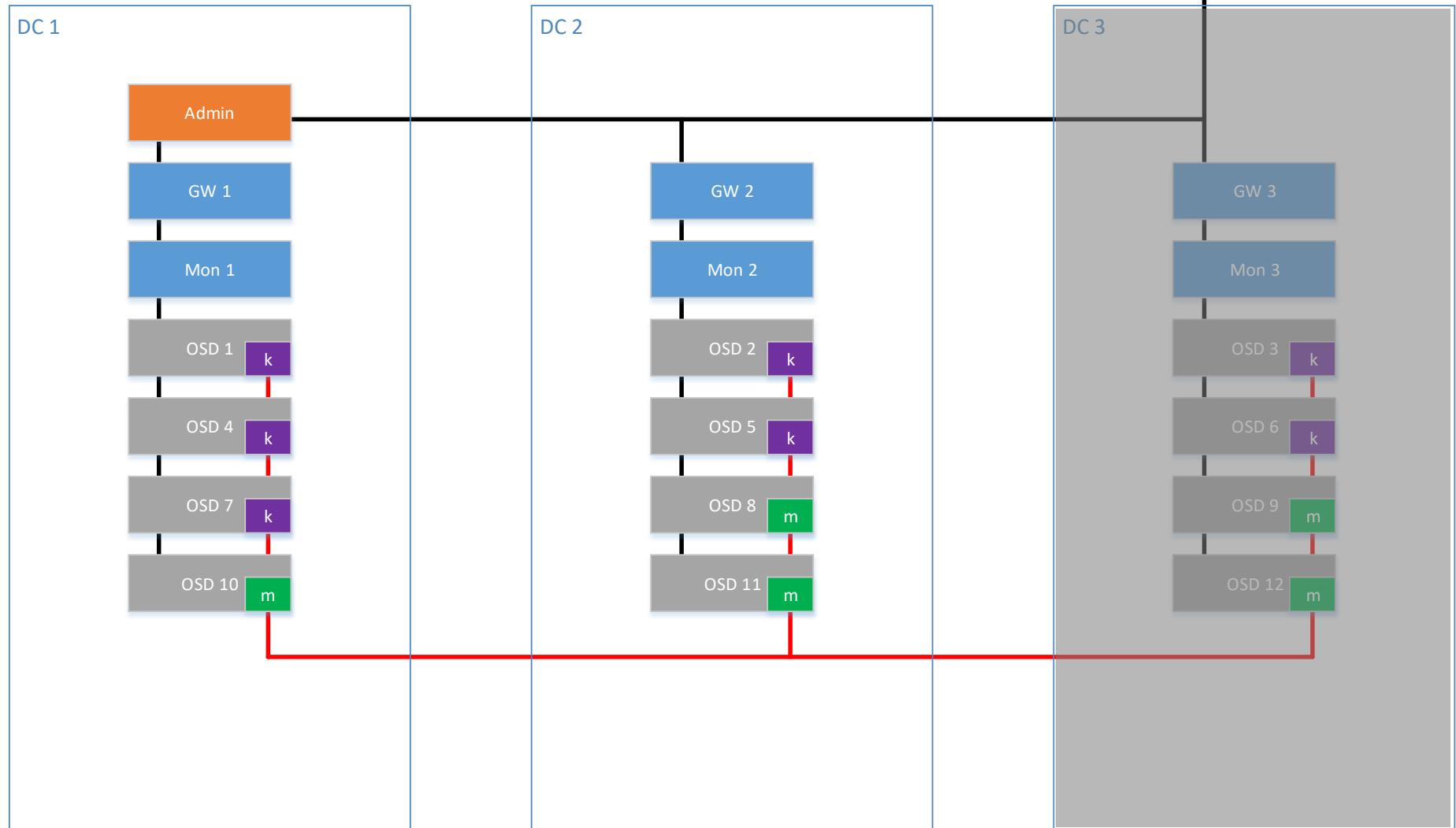
71% overhead



# 3 datacenter setup

## Erasure Coding k=7 m=5

71% overhead





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# Thank You

## **Customer references**

[www.suse.com/success](http://www.suse.com/success)



Phact is a one-stop shop for software and hardware solutions, support and consultancy in the Netherlands

**“SUSE Enterprise Storage offered the total package. While other solutions lacked the full range of functionality we were after or locked us into using proprietary hardware, with SUSE we didn’t have to compromise—we got an open, feature-rich solution, with the bonus of full enterprise support.”**

MARC HERRUER

*Founder and CEO  
Phact*

[www.suse.com](http://www.suse.com)



HKU is a liberal-arts university in the Netherlands offering preparatory courses, bachelor and master programs and research degrees in fine art, design, media, games, music, theatre and arts management.

**“In our experience, SUSE Enterprise Storage offers much lower TCO. Not only have we cut administration time and effort, but also the solution enables us to practically eliminate downtime.”**

**EMILE BIJK**

*Head of Network and Information Systems  
Hogeschool voor de Kunsten Utrecht (HKU)*

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# **BACKUP slides**

# Compliant Archives

## Definition and Drivers

Storage of Critical Data in a Secure Manner that Guarantees Data Integrity and Authenticity



## Drivers



Sarbanes Oxley



Emails, Voice Recordings



Business Apps



File Systems



Records



## Sources

# Compliant Archive Solution

## Partnership with iTernity

iTernity iCAS is a middleware that protects application data on SUSE Enterprise Storage

iCAS is certified to meet the legal requirements of healthcare and financial industries\*

### Use Cases:

- Email & File Archiving
- Banking Transaction Data
- Voice Recordings
- Patient Data
- X-Rays, Scans and MRIs
- Records Retention
- PII Data

100+ Certified  
Business Applications e.g.

**opentext™ VERITAS™**

**AGFA Agfa**  
HealthCare

**NICE®**

**SAP®**

**SER**



**MICRO FOCUS®**

**SAPERION**

iTernity iCAS



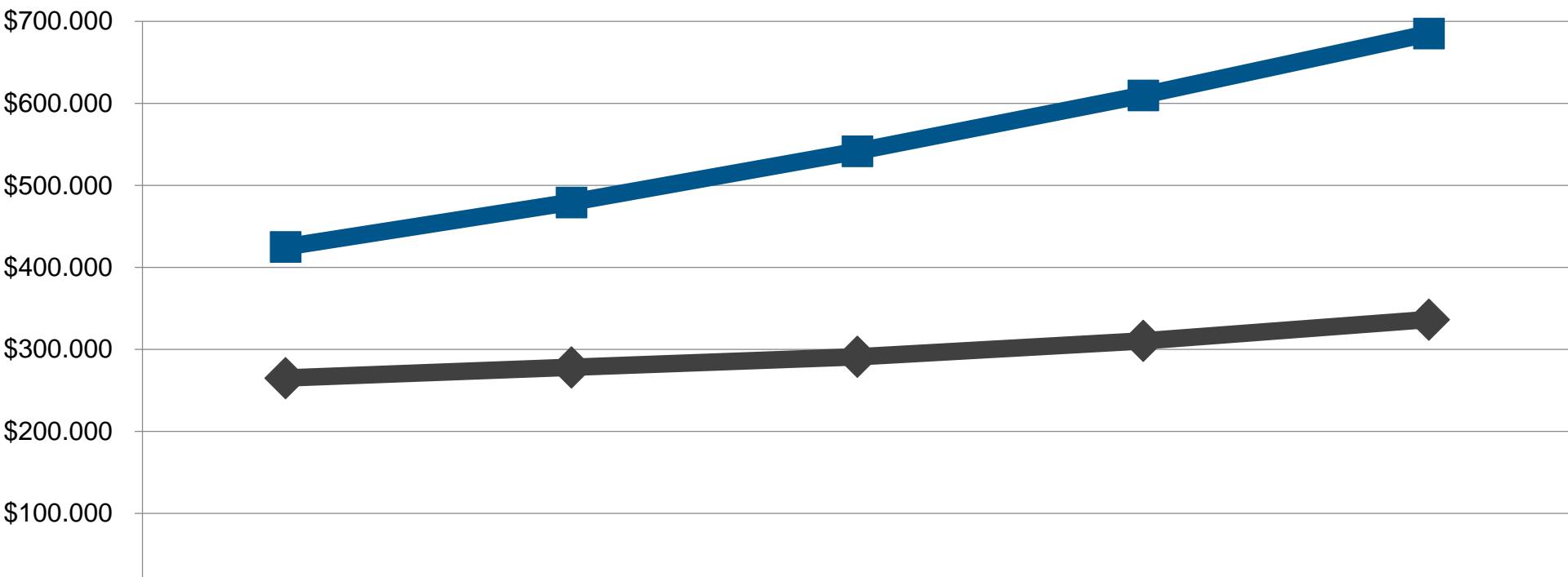
**SUSE Enterprise Storage**



# HPE/SUSE/iTernity vs EMC Centera

Cumulative Five-Year Cost of 600TB Growing at 25% Per Year

In year 1, the cost of the Dell EMC Centera CAS solution was almost \$200,000 and twice the price of the HPE/SUSE/iTernity iCAS solution. At the end of the 5 year period, the TCO of the Centera solution was \$350,000 more and over double the cost of the HPE solution.



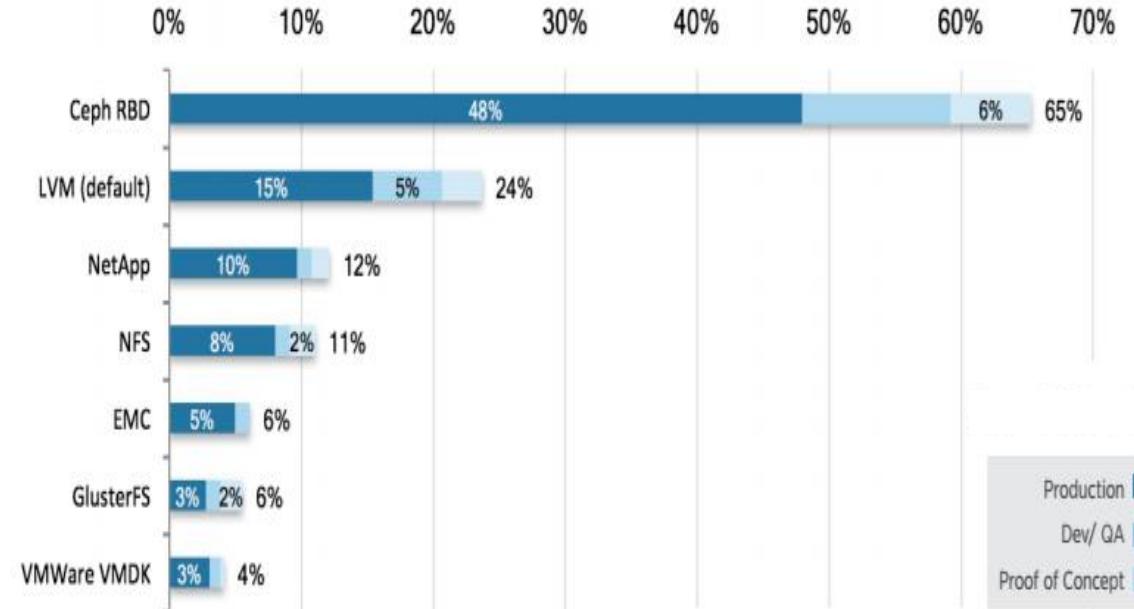
	Year 1	Year 2	Year 3	Year 4	Year 5
HPE/SUSE/iTernity iCAS	\$264,947	\$277,915	\$290,883	\$310,335	\$336,271
Dell EMC Centera CAS	\$425,005	\$479,325	\$541,527	\$609,811	\$685,146

# SUSE Enterprise Storage for OpenStack Cloud

Ceph is the...

## ...Most Deployed Block Storage Backend for OpenStack

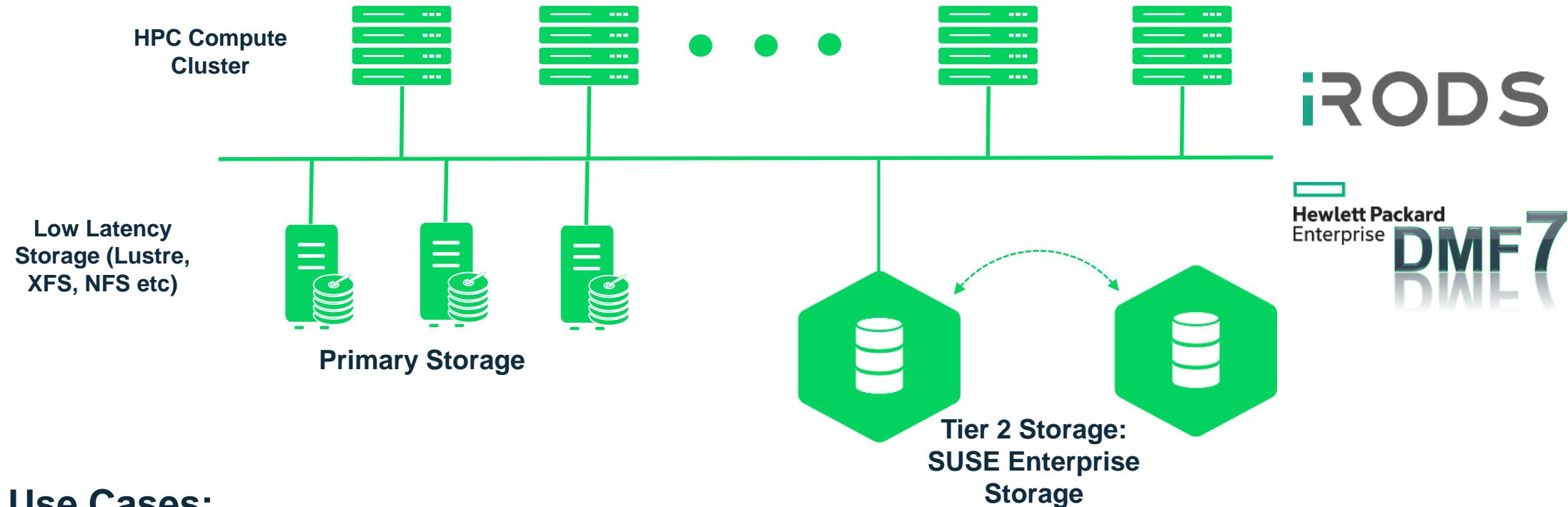
- Ceph RBD is used in almost Half the Deployments
- 48% Usage in Large Clouds with over 1000 Cores



OpenStack User Survey April 2017\*  
N=363

# HPC Storage Solution

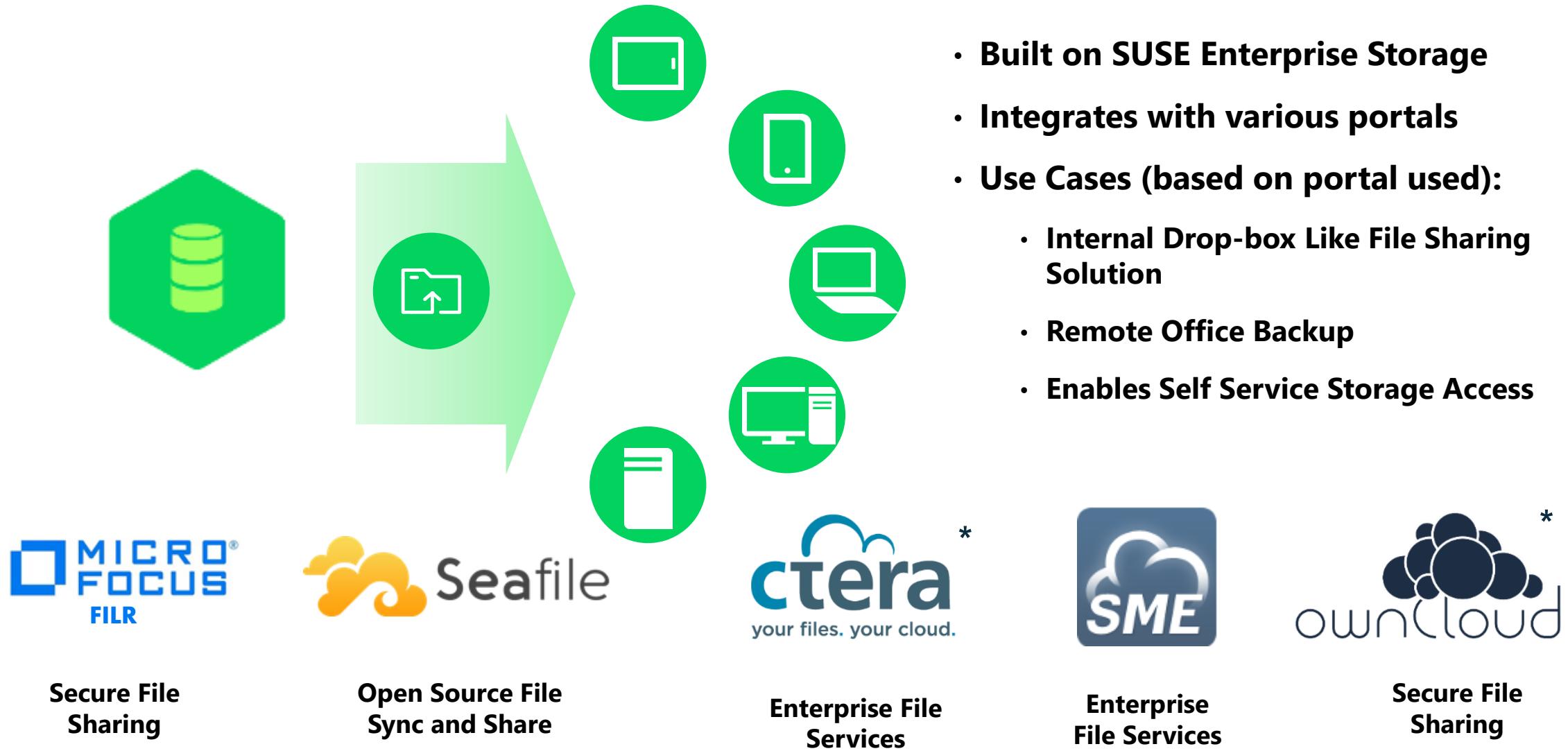
Most Common Use Case as Tier 2 Storage



- **Use Cases:**
  - Primary Storage (Certain Use Cases)
  - Archival Storage
  - Home Directories
- Certified with HPE Data Management Framework (DMF) and iRODS\*

\*: Coming Soon

# File Sync and Services Solution

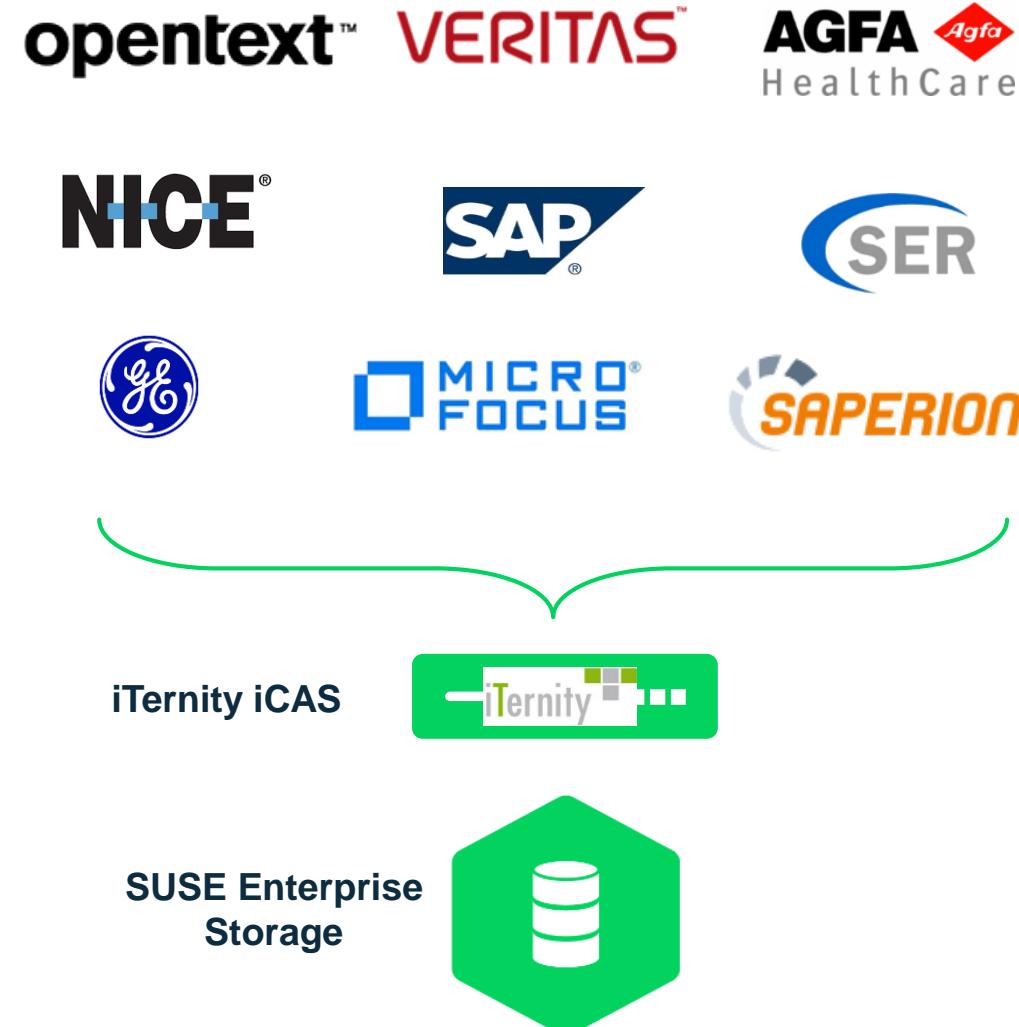


# SUSE Compliant Archive Solution

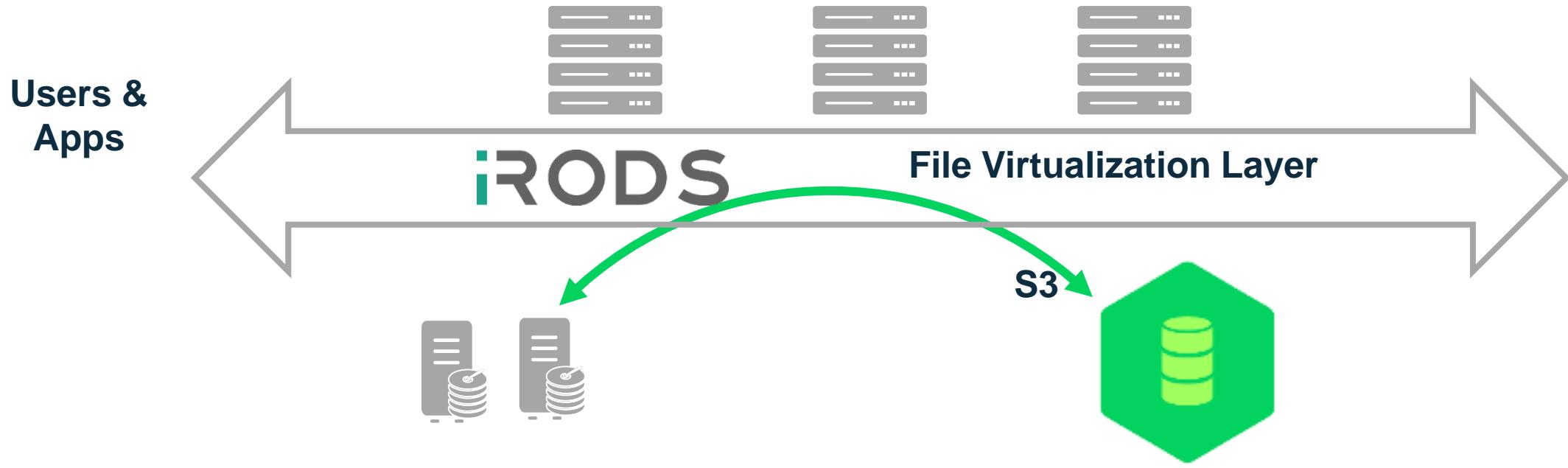
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- iCAS is certified to meet the legal requirements of healthcare and financial industries\*
- **Use Cases:**
  - Email & File Archiving
  - Banking Transaction Data
  - Voice Recordings
  - Patient Data
  - X-Rays, Scans and MRIs
  - Records Retention
  - PII Data

100+ Certified  
Business Applications e.g.



# iRODS Use Cases: Storage Tiering



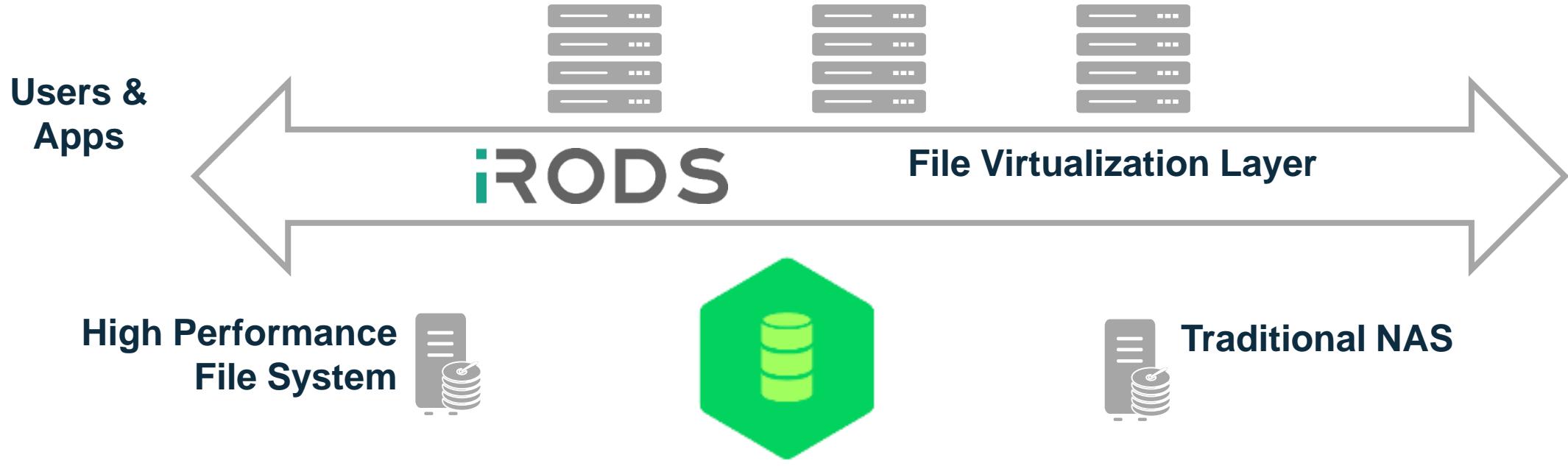
## Storage Tiering

- Data Migration based on Pre-specified Rules from Primary to Secondary Storage
- SES is the perfect archival storage in this use case

## Data Landing Zone

- Fast Tier of Storage for Incoming Stream of Data
- SES for Longer Term Storage

# iRODS Use Cases: Data Consolidation



## Consolidation

- Single Namespace that Spans Various Storage Technologies

## Secure Collaboration

- Multiple Users in various Geos can access data across various tiers based on policies

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