



SUSE Enterprise Storage 6

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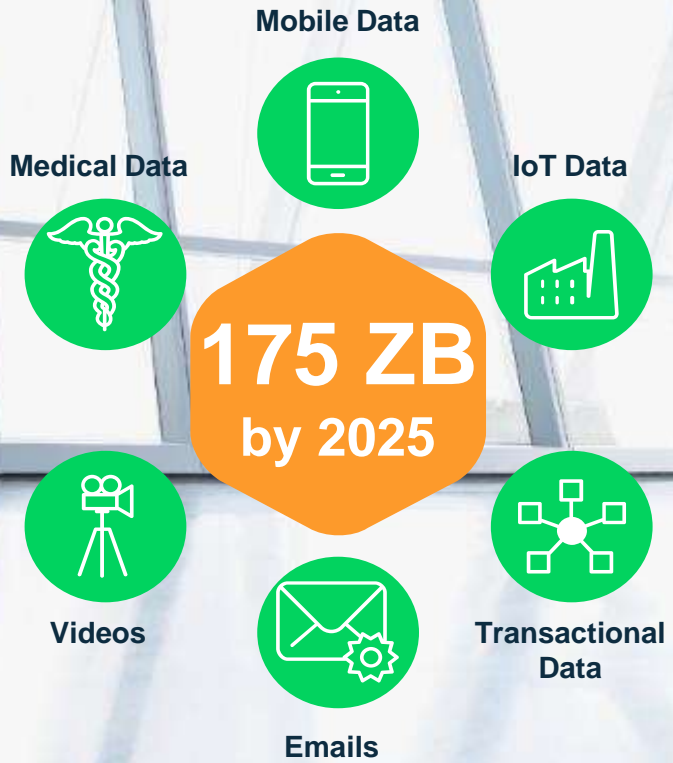
Agenda

- **Enterprise Storage Business Challenges**
- **SUSE Enterprise Storage Architecture**
- **SUSE Enterprise Storage 6**
- **SUSE Enterprise Storage Use Cases**
- **Questions**



Enterprise Storage Business Challenges

The Data Explosion Continues



Mobile Data



Medical Data



IoT Data



175 ZB
by 2025



Videos



Transactional
Data



Emails



SUSE Enterprise Storage

Bridge to the Future

Today's Data Center

- Traditional data center with storage silos
- Disparate network, compute and storage setup
- Data center disruptions because of regularly changing technologies

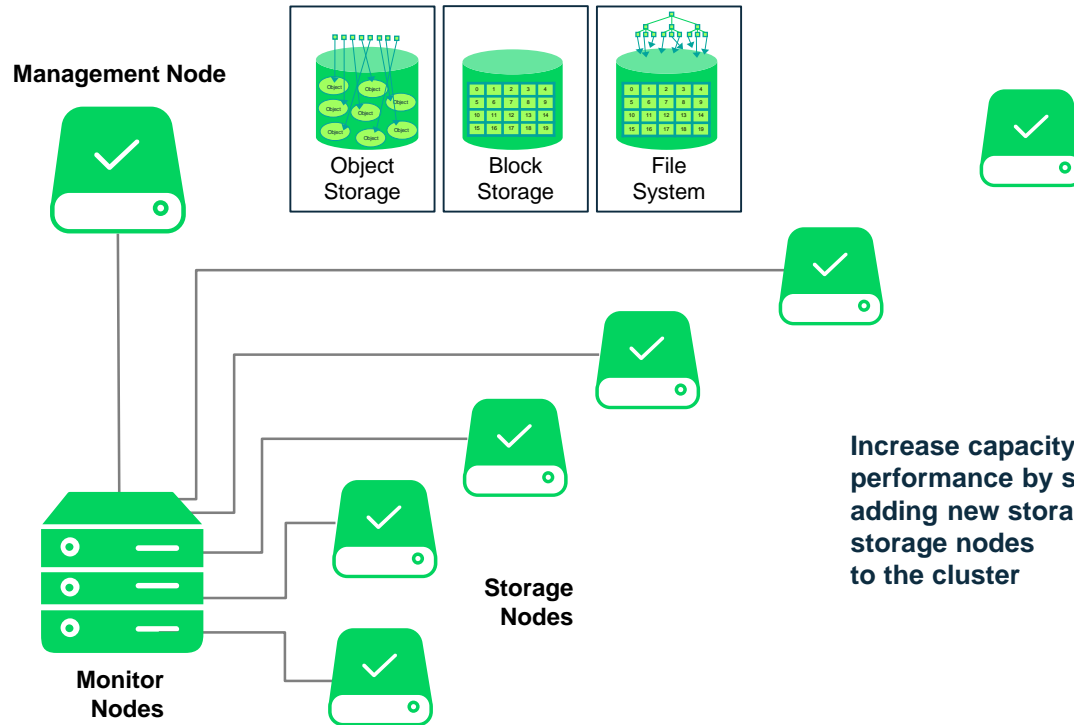
Tomorrow's Data Center

- Software-defined data center
- Agile infrastructure with support for DevOps model through automation
- Simplified data center management
- Increased speed of delivery

SUSE Enterprise Storage is the first step in a software-defined future.

SUSE Enterprise Storage

Unlimited Scalability with Self Managing Technology



Increase capacity and performance by simply adding new storage or storage nodes to the cluster



Limiting Factors of Traditional Enterprise Storage



**Difficult to Scale and
Manage Data Growth**



Expensive

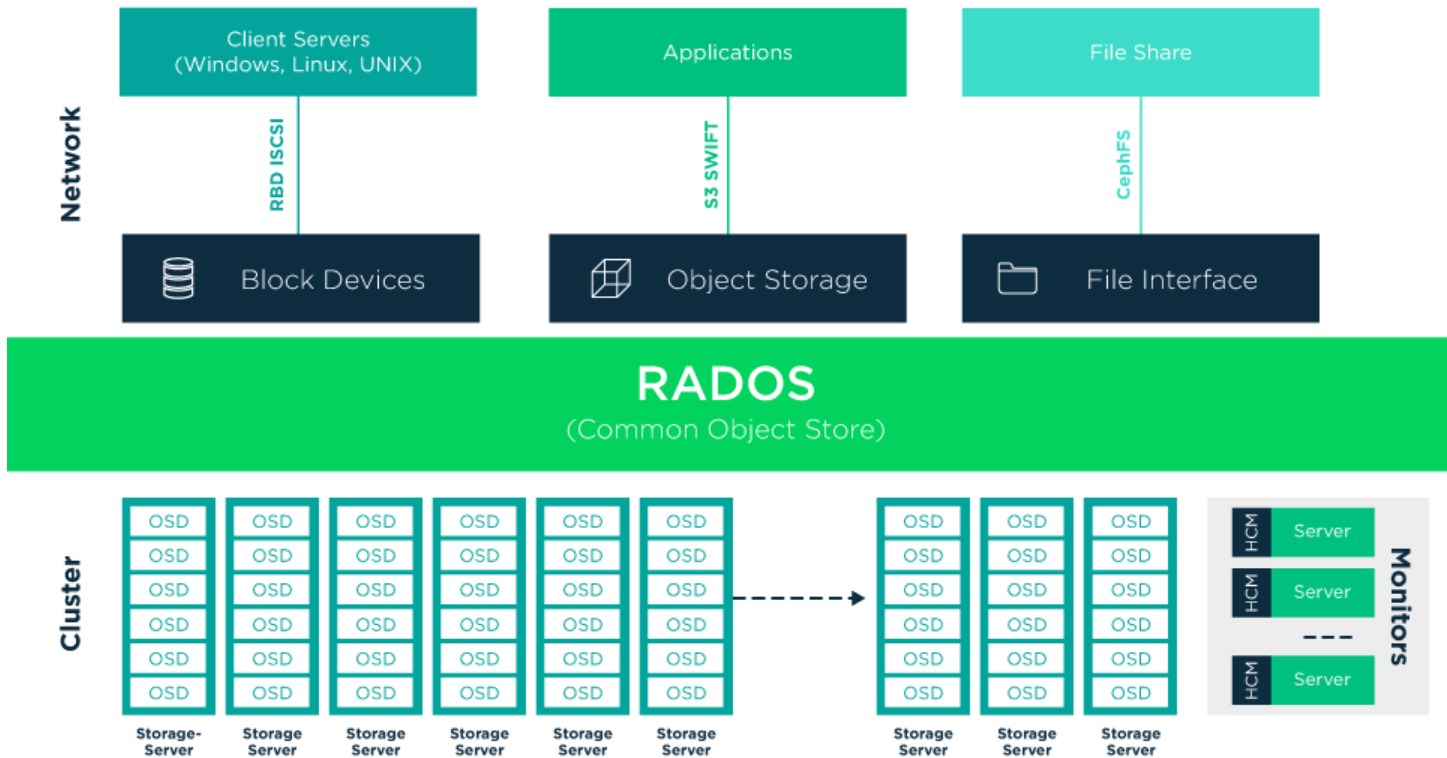


**Won't Extend to
the Software-defined
Data Center**

SUSE Enterprise Storage Architecture

Powered by Ceph Technology

SUSE Enterprise Storage Architecture

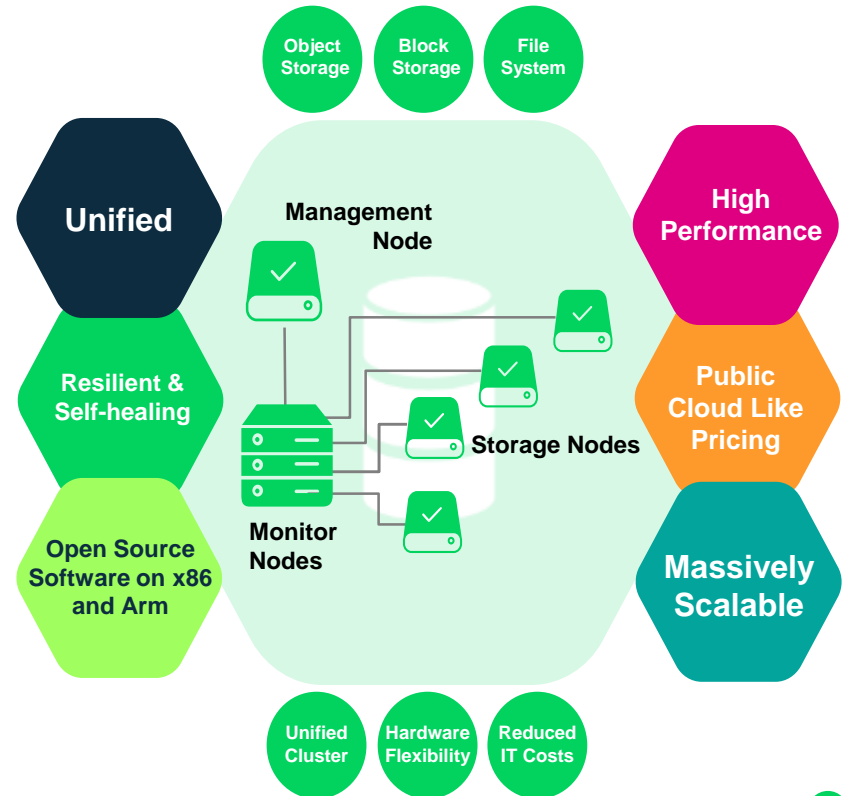


SUSE Enterprise Storage 6

SUSE Enterprise Storage

Last 12-month Accomplishments

- Launched SUSE Enterprise Storage 5.5
 - 8th release
- Latest upstream release Ceph Nautilus
 - 8 out of top 20 Ceph contributors are from SUSE
- SUSE team driving Ceph Dashboard upstream project
- SUSE more than doubled Ceph customers in FY18 relative to FY17



SUSE Enterprise Storage

Development Focus Areas



Manageability

- Ease of Installation
- GUI based Monitoring & Management



Interoperability

- Unified Block, File & Object
- Fabric Interconnects



Efficiency

- Cache Tiering
- Containerization
- Hierarchical Storage Management



Availability

- Backup/Archive
- Continuous Data Protection
- Remote Replication

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Manageability



- Ceph Dashboard (oA replacement)
- Phone home (metrics and error analysis)
- Enhanced PG balancing
- Autonomous PG scaling**
- CephFS directory quotas
- Graceful system shutdown
- Storage enclosure disk integration

** Items are tech preview

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Interoperability



- IPv6
- RGW Elasticsearch sync module
- Node to node encryption**
- Multiple CephFS instances in one cluster**
- NFS-Ganesha active/active architecture**

** Items are tech preview

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Efficiency



- QoS for RBD
- QoS for background operations
- S3 object policy driven tiering**

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Availability



- Unidirectional sync external cloud via S3
- CephFS snapshots
- Asynchronous file replication**

** Items are tech preview

SUSE Enterprise Storage Roadmap

SES 4: Nov 2016

SES 5: Oct 2017

SES 5.5: Oct 2018

SES 6: June 2019*

SES 7: Q2/Q3 2020*



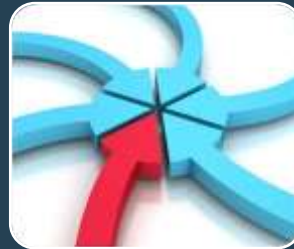
Unified File, Object & Block

- CephFS
- Multisite object replication
- Acquired openATTIC



Performance and Ease of Use

- BlueStore
- Compression
- Block/File Erasure code
- NFS/S3 interface
- NFS/CephFS interface
- OpenATTIC integrated with DeepSea
- Enhanced monitoring and management



Interoperability and Security

- Integration with SUSE OpenStack Cloud
- CIFS/Samba interface
- Non SUSE Ceph clients
- Event notification
- AppArmor integration
- Security audit testing



Enhanced Management and Hybrid Cloud

- Ceph Dashboard
- Enhanced monitoring
- Public cloud product
- Sync to external cloud
- Phone home
- RBD QoS
- CephFS snapshot
- Async file replication



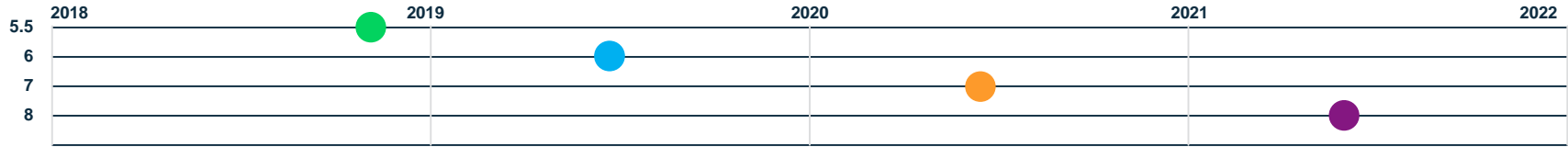
Containerization and Autonomous Self-Healing

- Containerization
- Enhanced intelligent data placement
- Guided troubleshooting
- Guided HW upgrade
- Guided OSD repair
- Data deduplication
- RDMA interconnect
- Windows drivers

*: These dates are indicative only, not guaranteed

Demo

SUSE Enterprise Storage



5.5

Built On

- Ceph Luminus release
- SUSE Linux Enterprise Server 12 SP3

Manageability

- Internationalization
- Usability enhancements
- Predefined profiles
- Autonomous data balancer**
- DeepSea (Salt) phase 3

Interoperability

- Non SUSE RBD and CephFS clients
- CIFS/Samba
- AppArmor security module

Availability

- Multisite RADOSGW N+1 with N/N-1

Efficiency

- BlueStore/RocksDB optimizations

6

Built On

- Ceph Nautilus release
- SUSE Linux Enterprise Server 15 SP1

Manageability

- Ceph Dashboard (oA evolution)
- Phone home (metrics and error analysis)
- Enhanced PG balancing
- Autonomous PG scaling**
- CephFS directory quotas
- Graceful system shutdown
- Storage enclosure disk integration

Interoperability

- IPv6
- RGW Elasticsearch sync module
- Node to node encryption**
- Multiple CephFS instances in one cluster**
- NFS-Ganesha active/active architecture**

Availability

- Unidirectional sync external cloud via S3
- CephFS snapshots
- Asynchronous CephFS replication**

Efficiency

- SW cache layer**
- QoS for RBD and background operations
- S3 object policy driven tiering**

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Built On

- Ceph Octopus release
- SUSE CaaS Platform
- SUSE Linux Enterprise Server 15 SP1

Manageability

- Kubernetes orchestration by Rook
- Phone home analysis tools
- Autonomous PG scaling
- Self-healing PG**

Interoperability

- Hyper-converged SDI infrastructure**
- Containerized deployment
- Native Windows client drivers
- Node to node encryption
- Multiple CephFS instances in one cluster
- NFS-Ganesha active/active architecture

Availability

- Bidirectional sync external cloud via S3
- Asynchronous CephFS replication

Efficiency

- SW cache layer
- Crimson performance optimization**
- S3 object policy driven tiering
- QoS for RADOS

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Built On

- Ceph Pharaoh release
- SUSE CaaS Platform
- SUSE Linux Enterprise Server 15 SP2

Manageability

- AIOps driven self management
- Phone home with consulting services
- Self-healing PG

Interoperability

- Hyper-converged SDI infrastructure
- RDMA back-end**
- NVMe over fabrics

Efficiency

- Data deduplication
- Crimson performance optimization

** Items are tech preview

* Information is forward looking and subject to change at any time.

SUSE Enterprise Storage Management



5.5	6	7	8
<p>Configure</p> <ul style="list-style-type: none"> Convert EC to replication (visa versa) <p>Manage</p> <ul style="list-style-type: none"> RBD snapshot OpenStack integration Cluster rebuild progress Admin node redundancy phase 1 <p>Monitor</p> <ul style="list-style-type: none"> Event notification alerts** 	<p>Configure</p> <ul style="list-style-type: none"> iSCSI NFS-Ganesha Phone home RBD QoS parameters Background operation parameter (QoS) RBD remote replication <p>Manage</p> <ul style="list-style-type: none"> Role-based Ceph dashboard Localized Ceph dashboard Ceph dashboard SSO (SAMLv2) Crush map viewer RBD snapshot <p>Monitor</p> <ul style="list-style-type: none"> Real-time performance metrics Scale-out Prometheus monitoring Event notification alerts SNMP traps Command audit log 	<p>Configure</p> <ul style="list-style-type: none"> Deploy new OSD to existing node CIFS/Samba RGW and CephFS remote replication Sync to external cloud S3 object policy driven tiering <p>Manage</p> <ul style="list-style-type: none"> CephFS snapshot Cluster topology map <p>Monitor</p> <ul style="list-style-type: none"> OSD and MDS statistics <p>Diagnose</p> <ul style="list-style-type: none"> Predictive disk failure analysis 	<p>Configure</p> <ul style="list-style-type: none"> Deploy new node to existing cluster <p>Manage</p> <ul style="list-style-type: none"> Automated upgrade process <p>Monitor</p> <ul style="list-style-type: none"> Ceph client performance <p>Diagnose</p> <ul style="list-style-type: none"> Guided troubleshooting Guided OSD repair process

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SUSE Enterprise Storage Use Cases

Use Case Focused Solutions

Partnership Ecosystem

Classic Workloads

Backup to Disk Solution



File Sync and Share

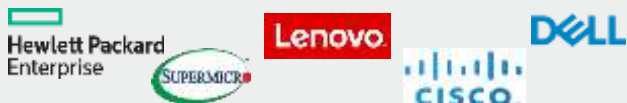


HPC Storage



Flexible Configs

Certified Reference Architectures



Appliance

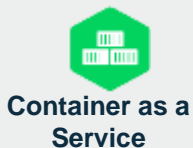
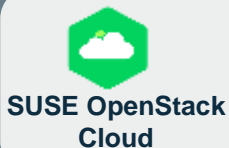


Custom Build

DIY with COTS Servers

Cloud Native Workloads

Cloud & App Delivery



Analytics



Custom Apps

