Costefficient Storage with Dataprotection for the Cloud Era

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Once Upon a Time...
A customer story – Requirements analysis I.

Large Capacity  
High Availability  
Data Protection  
Easy Infrastructure Integration

Customer

Store Data  
Cost efficiency  
Long Term  
Object Store
EU Global Data Protection Regulation

DATA PROTECTION AND PRIVACY
EU Global Data Protection Regulation

DATA PROTECTION AND PRIVACY

- **Regulation/Law** not a Directive
- Immediate effect on 28 EU members after **2 year transition period**
- **Does not require any enabling legislation** to be passed by governments
- **Extends the scope to all foreign companies** processing data of EU residents

Unify Data Protection within the EU with a single law
EU Global Data Protection Regulation

DATA PROTECTION AND PRIVACY

What technologies can support the requirements?

- Encryption
- Access Control
- Data Integrity
- Availability
Customer story – requirements analysis II.

Large Capacity

High Availability

Data Protection

Easy Infrastructure Integration

Store Data

Cost efficiency

Long Term

Object Store
Oracle StorageTek Tape
Oracle StorageTek Tape Libraries

- Enterprise Tape Storage for longtime archiving
  - FC connections
  - Large storage capacity (180TB -> 50PB -> 2EB)
  - 2-640 Tapedrives
  - Enterprise Drives (StorageTek T10000D)
  - Up to 700TB/h native throughput
  - 30-100000 Cartridges

- Economic efficiency:
  - Minimal Power consumption
  - Minimal Cooling
  - High datadensity

- Noteworthy:
  - Redundant and Hot-Swappable parts
  - Wireless Rails technology
  - Lowest support cost for the storage media
Enterprise Tape Drives T10000D

T10000D: Lowest TCO for long-term archives

• T10000D Specifications
  – 8.5 TB Capacity native (uncompressed)
  – 252MB/sec native Throughput (LTO similar)
  – 2 GB Cache
  – Integrated Encryption capability – no performance impact (LTO similar)
  – Data Integrity Validation – without retransferring data to the servers (LTO similar)

• Noteworthy:
  – Investment Protection: Previous cartridge generations can be read/written and are reformattable
  – High data density due to large surface area and thousands of tracks
  – Contact-free read/write of data
Customer story – requirements analysis III.

Large Capacity
High Availability
Data Protection
Easy Infrastructure Integration

PERFORMANCE

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ZS5 Storage Appliance
Oracle Unified Storage
ZFS Storage Appliances

ZFS Storage Operating System
- Most powerful storage software suite
- Engineered integration with Oracle software

ZS5-2
- Single or Dual Controllers
- 4x18-core 2.3GHz
- 768GB or 1.5TB DRAM
- 4 PCIe Expansion Slots
- 3PB Capacity (DE3)
- 102TB Read Flash
- 12TB Write Flash

ZS5-4
- Single or Dual Controllers
- 8x18-core 2.6GHz
- 3TB DRAM
- 7 PCIe Expansion Slots
- 9PB Capacity (DE3)
- 307TB Read Flash
- 38TB Write Flash

35% Faster and More Scalable than the Previous Generation
ZFS Storage Appliance Hybrid Storage Pools

Flash-Performance to Disk capacities

95% Application I/Os served from RAM and Flash (1000x faster than Disk)

100% of the data stored on enterprise disks

Hybrid Storage Pool Latency

DRAM 0.03 ms
FLASH 0.1 ms
DISK 30 ms

Data stored in a unique way on hierarchical filesystems with **variable backend**

Supported block sizes: 4k, 8k, 16k, 32k, 64k, 128k, 256k, 512k to 1MB
Deep-Dive Analytics Eliminates Downtime
Per-VM and Per-Database-Level Visibility Finds Problems—Enables Fast Resolution

Highly Granular Analytics

- Immediate access to relevant graphical data per database or pluggable database
- Quick, visual assessment of application-to-database-to-storage data path along with Enterprise Manager
- Dynamic virtualization-level insights on performance and health analytics
- Visibility into bottlenecks and issues that might exist in the virtual infrastructure
- Real-time system performance and utilization of VMs
- Load balancing and tuning of virtualized applications and VM data stores
### ZS | Unified Storage all SW-Module’s enabled!

<table>
<thead>
<tr>
<th>Data protocols</th>
<th>Data services</th>
<th>Management</th>
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</table>
| • Oracle Intelligent Storage Protocol  
  • Fibre channel  
  • iSCSI  
  • Infiniband  
    - NFS/RDMA  
    - iPoIB  
    - iSER  
    - SRP  
  • NFS V3 and V4  
  • dNFS  
  • SMB/CIFS  
  • HTTP  
  • WebDAV  
  • Cloud APIs  
  • FTP/SFTP/FTPS | • Encryption *  
  • HCC: Hybrid Columnar Compression  
  • Hybrid storage pools  
  • Single, double and triple-parity RAID  
  • File Systems and Volumes  
  • Built-in data integrity  
  • Local and Remote replication *  
  • Snapshots and clones *  
  • Quota(s)  
  • In-line deduplication  
  • Compression  
  • Encryption  
  • Antivirus via ICAP protocol  
  • Online data migration  
  • Clustering | • Single Pane of Glass BUI and CLI  
  • Management dashboard  
  • Hardware/component view  
  • Role-based access control  
  • Monitoring: SNMP  
  • Event and threshold based alerting  
  • Live graph analytics  
  • Scripting  
  • Virtual networking  
  • Snap Management Utility *  
  • Enterprise Manager integration |

*additional licences required
Addressing customers’ demand

**ZS5-2**
- 72 CPU cores
- 768-1536 GB L1 Cache
- Max. 102 TB L2 SSD Cache

**Performance**

**ZS5-4**
- 144 CPU cores
- 3072 GB L1 Cache
- Max. 230 TB L2 SSD Cache

**Encryption**

Share-and LUN-Based

Only Diskbased or external products needed

*with ONTAP 9.1 only on bigger FAS - Volume based but slows down System

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Customer story – requirements analysis IV.

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PERFORMANCE
Hierarchical Storage Manager (HSM)
Overview of Oracle HSM Tiering

1. Application writes file to StorageTek QFS file system and is stored on disk cache.
2. File system inodes and Oracle HSM metadata are generated.
3. "Archive" copies created based on policy.
4. File request from application is retrieved from Oracle HSM disk cache.
5. Copy on disk cache can be "released" based on the policy.
6. When the application requests the file, it is "staged" back to the disk cache and delivered to the application.

Metadata remains on primary disk after file is "released".
Oracle Hierarchical Storage Management

Key Features

- Volume-independent licensing
- **Lowest Price/Terabyte through Tape technology**
- Auditable Archiving option, WORM (Write Once Ready Many)
- Native Network Filesystem Access for UNIX and Windows clients
- HighAvailability and Dataredundancy between storagetiers and datacenters
- Dataintegrity checking, Encryption and Compression with Storageintegration
- Scalability to hundreds of Petabytes in a data dense form using less DC floorspace
Customer story – requirements analysis IV.

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PERFORMANCE
Customer story – requirements analysis IV.

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PERFORMANCE
APPENDIX HSM

Customer Configurations