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SOFTWARE DEFINED JOURNEY

Storage 2 Day 2022

Frank Benke

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FRANK BENKE

HEAD OF IT

28 YEARS OF INFRASTRUCTURE
UNIX & LINUX NERD
AUTOMATION ADDICTED
SDS EVANGELIST
SITE RELIABILITY ENGINEER

AGENDA

1. THE ENVIRONMENT
2. IMPRESSIONS
3. 2015 - IN THE BEGINNING
4. FIRST APPROACH NEXENTA
5. SDS DEFINITION
6. 7 YEARS LATER
7. STORAGE GROWTH
8. TIMELINE
9. SOFTWARE DEFINED STORAGE VARIANTS
10. DO WHAT THEY DO BEST
11. HEADQUATER INSTALLATION
12. KEEP IN MIND & KEY TAKEAWAYS

THE ENVIRONMENT

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Global Footprint

Virtualized Platform

- 99% virtualized
- Technology workloads
- Software defined anything

Technology Oriented Business

- New service models
- Early adopter
- Risk aware

Strategy

YOUR IMPRESSIONS ON SDS

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IMPRESSIONS ON SDS

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Deduplication

Availability Cluster

Storage Virtualization

Filer Services

Storage Tiering

Hardware Abstraction

Hyperconvergence

Storage Hypervisor

Data Replication

Ressource Management

Cluster Filesystems

Snapshots

Compression

Capacity Licensing

2015 – IN THE BEGINNING

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- Starting from 30TB projected 1.xPB in ten years
- Data growth
  - Business – 28% p.a.
  - Projects – 95.000 files p.p. max
  - Formats – 50% p.a.
  - New applications
- Data locality

- Midmarket constraints
  - IT budget in machinebuilding 2% revenue
  - Wide range of requirements
  - Investmentprotection

	A	B	C	D	E	F
1	Storage Pool	Faktoren	Bestand	2016	2017	2018
2						
3	jährliches Wachstum	63,00%				
4						
5	AMS		680, GB	1108,4 GB	1806,69 GB	2944,91 GB
6	AMS WEMO		240, GB	391,2 GB	637,66 GB	1039,38 GB
7	DBWORKS		300, GB	489, GB	797,07 GB	1299,22 GB
8	PDM			200, GB	326, GB	531,38 GB
9	Exchange		919, GB	1497,97 GB	2441,69 GB	3979,96 GB
10	LYNC DB		244, GB	397,72 GB	648,28 GB	1056,7 GB
11	EdgeCAM		50, GB	81,5 GB	132,85 GB	216,54 GB
12	Mailstore		900, GB	1467, GB	2391,21 GB	3897,67 GB
13	Ticket DBs		80, GB	130,4 GB	212,55 GB	346,46 GB
14						
15	Summe Storage hot		3413, GB	763,19 GB	9394, GB	15312,22 GB
16	Snapshot Quote hot	15,00%	511,95 GB	864,48 GB	1409,1 GB	2296,83 GB
17						
18						
19	Virtual Machines		3259, GB	5312,17 GB	8658,84 GB	14113,9 GB
20	VMs Legacy		202, GB	329,26 GB	536,69 GB	874,81 GB
21						
22						
23	File CAD		5050, GB	8231,5 GB	13417,35 GB	21870,27 GB
24	File Migration RH		1980, GB	3227,4 GB	5260,66 GB	8574,88 GB
25	File Projekte		2920, GB	4759,6 GB	7758,15 GB	12645,78 GB
26	File Infrastruktur		1600, GB	2608, GB	4251,04 GB	6929,2 GB
27	File FTP Transfer		160, GB	260,8 GB	425,1 GB	692,92 GB
28	File Userdaten		800, GB	1304, GB	2125,52 GB	3464,6 GB

GENERAL APPROACH

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Classic Hardware

- Proven technology
- Expensive
- High lock in potential
- Forklift upgrades
- Brute force virtualization
- Limited scale out options
- Established vendors

Turnkey Hyperconverged

- Virtualization integrated
- Scale out architecture
- Overprovisioning issues
- Restrictive scale rules
- High secondary license cost
- Shooting stars

Software Defined

- Some choice of hardware
- Individual sizing
- Supportmatrix issues
- Some virtualization support
- Scalable concepts
- Niche players
- Flexible (!!!)

FIRST APPROACH NEXENTA

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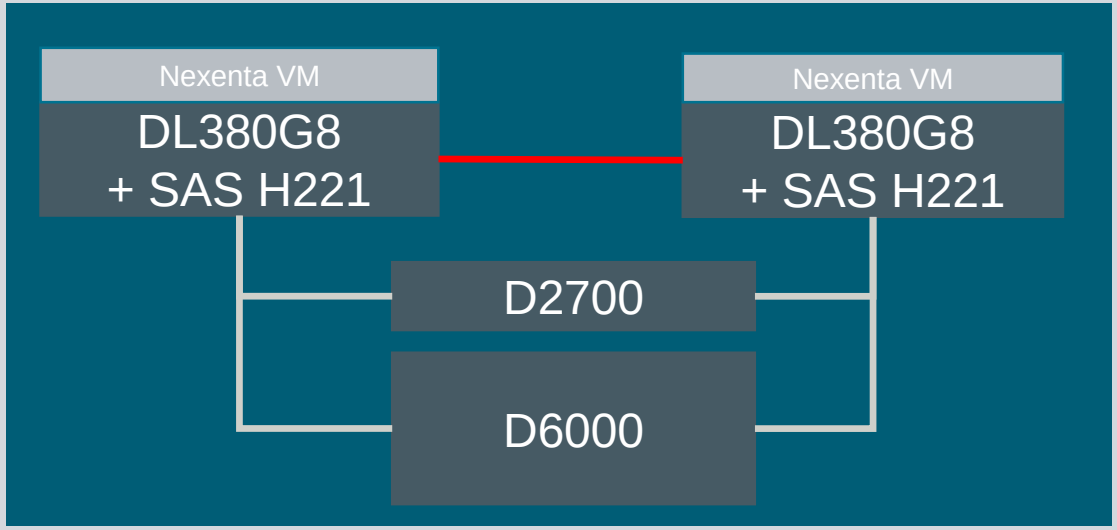
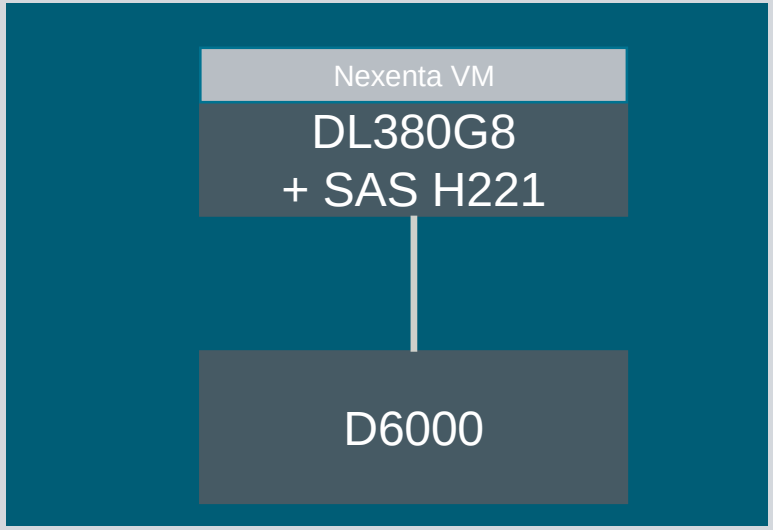
POC Nexenta & HPE VSA Appliance
Nexenta with ZFS
First installation in EMEA
High available virtualized cluster

Snapshot target backup
LZ4 & ZRAID 2 vs. Mirror
Do it yourself - HCI
Easy compatibility validation





SDS DEFINITION

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Hardware Suppliers

- Storage virtualization & hardware abstraction
- Policy based management
- Object storage
- SAN & Storage Networking
- Alternate price moedels (OS centric)

Software Suppliers

- Software based delivery
- Installation agnostic
- Baremetal heavy
- Feature centric
  e.g. dedup, snapshots, replication, …

Hyperconverged Suppliers

- Virtualization integrated
- Software defined datacenter driven
- Scale out architectures
- Distributed or virtual global files systems
- Dynamic provisioning

Community

- Open source driven
- NAS heavy
- Access protocol centric

7 YEARS LATER

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APPLIANCES ALERTS LOGS ANALYTICS adminbenke

Appliances

DEPLOY NEXENTACLOUD APPLIANCE + REGISTER APPLIANCE +

clsphgdefrhcnx-... 172.30.33.92, 172.30.33.93 VER. 5.3.0
TOTAL 84.28 TiB FREE 78.70 TiB
SERVICES: NFS

	SPHGDEFRHCNX01-PROD		SPHGDEFRHCNX02-PROD	
CPU Util	0.95%		0.89%	
	R	W	R	W
IOPS	19	164	9	112
BW	1 MBps	2 MBps	305 KBps	695 KBps
Lat	157µs	66µs	58µs	30µs

LABEL: Germany Cluster FR1Datacenter

clsvrbnx2-prod 172.31.2.108, 172.31.2.110 VER. 5.2.2
TOTAL 84.28 TiB FREE 34.54 TiB
SERVICES: HPR, NFS

	SVRBNX03-P		SVRBNX04-P	
CPU Util	4.19%		12.82%	
	R	W	R	W
IOPS	321	673	1872	2591
BW	13 MBps	7 MBps	109 MBps	57 MBps
Lat	1ms	291µs	455µs	246µs

LABEL:

clsvrbnx3-prod 172.31.2.116, 172.31.2.117 VER. 5.2.2
TOTAL 84.28 TiB FREE 30.51 TiB
SERVICES: NFS

	svrbnx06-p		svrbnx05-p	
CPU Util	6.54%		7.99%	
	R	W	R	W
IOPS	1972	1612	5002	1241
BW	25 MBps	12 MBps	64 MBps	13 MBps
Lat	215µs	169µs	94µs	231µs

LABEL: Germany Cluster RHB

clsvhaatkrnx-prod 172.26.224.20, 172.26.22... VER. 5.3.0
TOTAL 84.28 TiB FREE 58.63 TiB
SERVICES: NFS

	SVHAATKR-NX01-PROD		SVHAATKR-NX02-PROD	
CPU Util	6.45%		3.27%	
	R	W	R	W
IOPS	147	148	14	7
BW	711 KBps	842 KBps	174 KBps	342 KBps
Lat	115µs	48µs	16µs	860µs

LABEL: Austria Cluster DFT

clsvwsge-prod 172.26.152.21, 172.26.15... VER. 5.4.0
TOTAL 84.28 TiB FREE 47.97 TiB
SERVICES: NFS

	SVWSGENX02-PROD		SVWSGENX01-PROD	
CPU Util	15.44%		5.93%	
	R	W	R	W
IOPS	3762	657	198	29
BW	16 MBps	27 MBps	29 MBps	736 KBps
Lat	35µs	367µs	385µs	4ms

LABEL:

clsvindanx-prod 172.26.160.20, 172.26.16... VER. 5.3.0
TOTAL 63.21 TiB FREE 42.68 TiB
SERVICES: NFS

	SVINDANX01-PROD		SVINDANX02-PROD	
CPU Util	3.15%		7.07%	
	R	W	R	W
IOPS	1	17	81	1
BW	3 KBps	106 KBps	17 MBps	2 KBps
Lat	38µs	20µs	54µs	780µs

LABEL:

clsvwten-prod 172.26.192.20, 172.26.19... VER. 5.4.0
TOTAL 84.28 TiB FREE 56.25 TiB
SERVICES: NFS

	SVWTEN-NX01-PRD		SVWTEN-NX02-PRD	
CPU Util	2.72%		11.87%	
	R	W	R	W
IOPS	0	0	1264	1093
BW	0	0	14 MBps	8 MBps
Lat	0µs	0µs	130µs	876µs

LABEL: Germany Cluster WaldorfTechnik

BUT …

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CONs

- Vendor issues

- Hardware supply
- EOL disks & JBODs
- Pricedevelopments
- Knowledge transfer

PROs

- Vendor independency

- 80% reduced storage budget
- Exceptional degrees of freedom
- Very high performance
- High availability
- Easy migrations
- Easy availaility

STORAGE GROWTH & HIGHLIGHTS

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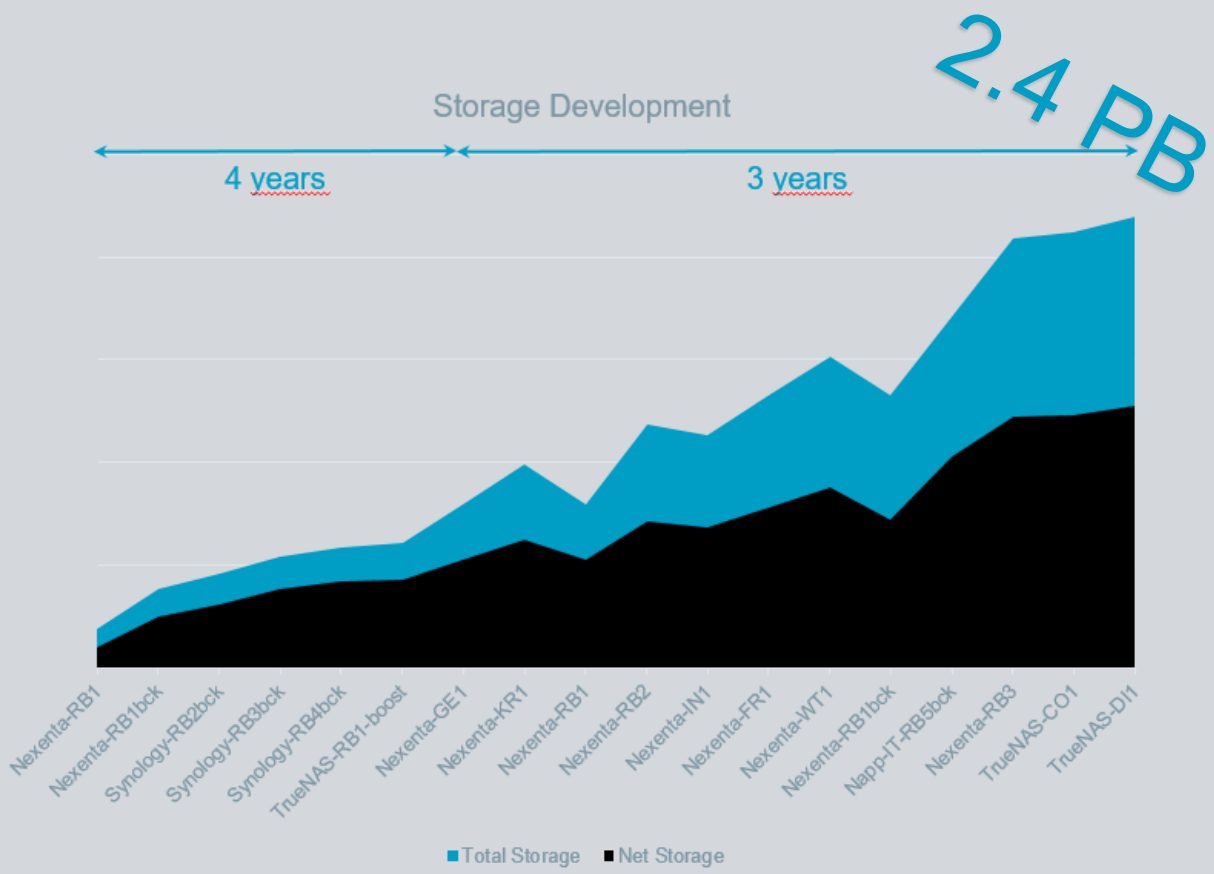
- ZFS Performance
- ALL flash systems
- License migration
- Platform agnostic migration
  - Nexenta -> Napp IT
- High IO Performance
- Hardware migration
  - HPE D6000 -> HGST
- Open Source Implementations



TIMELINE

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2015	2016	2018	2018	2019
Initial HC Nexenta Cluster	Snapshot Target Nexenta	Performance Systems True NAS	Location HC Nexenta Clusters	Restructure Nexenta
Hyperconverged Application True NAS	Backup Migration NappIT	Location True NAS	Production Tests Open-E	Archive & Backup Tier Tests Open-E & TrueNAS
2020	2021	2021	2022	2022

completed

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SOFTWARE DEFINED STORAGE VARIANTS

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Nexenta

- Proven and reliable
- High performance
- Vendor uncertainty – DDN & Tintri
- Robust implementation (Solaris)
- Easy to use management platform

True NAS

- Free version SDS
- High performance
- Reliable and easy to use
- Convenient feature set
- Good ZFS Implementation (BSD)
- Vendor push to appliance

Napp - IT

- Free version
- Linux based
- High ZFS compatibility
- Not so comfortable management

Open - E

- Linux based
- Attractive price model
- ZFS performance
- True high availability clusters
- Virtualisation support

DO WHAT THEY DO BEST

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DIY Hyperconverged

- High available & standalone
- Production workloads
- Caching workloads
- Hardware independent

Baremetal

- Production high available
- Very high performacne
- Snapshots
- Replication

- Hpyervisor independent

Virtualized general purpose

- Cheap tier two storage
- Filerservices
- S3 object storage
- VMWare based

- Snapshots
- Replication

HEADQUATER INSTALLATION

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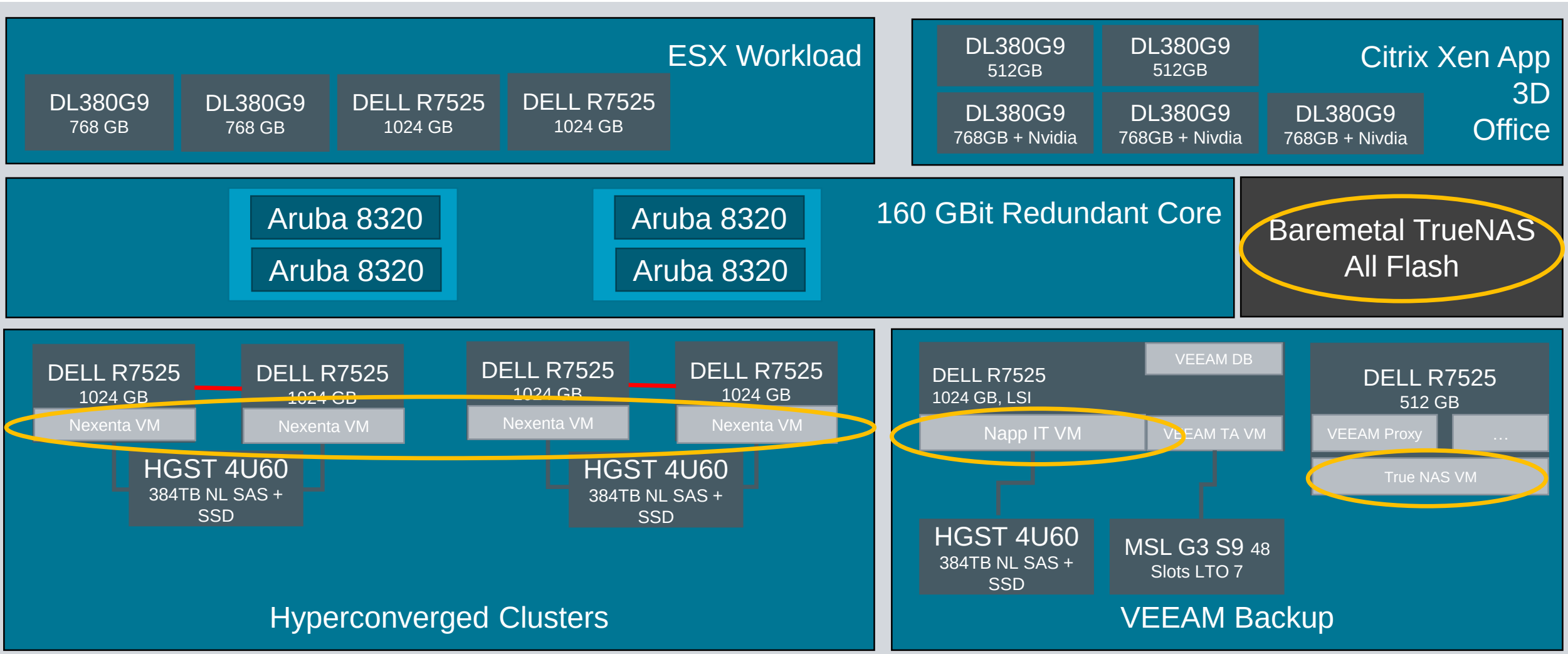

KEEP IN MIND

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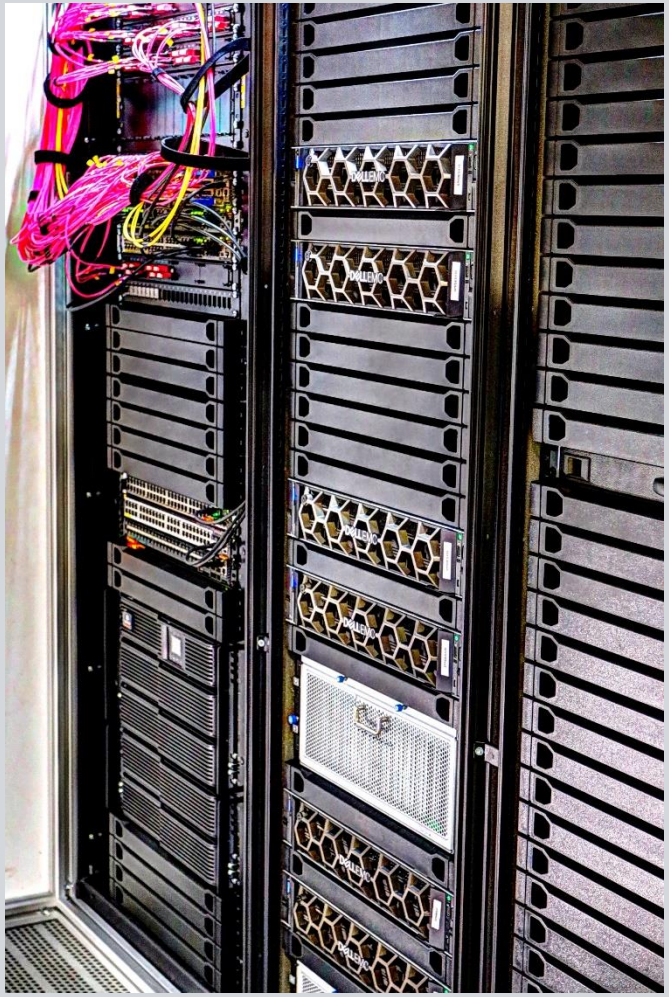
- Market shifts
- Little knowledge in the market
- Hardware compatibility
- SAS architecture
    - Blade environments
- Vendor lock out walls
- Boot device compatibility
- Open source impact



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- SCALE UP & SCALE OUT
- FLEXIBILITY IN CHOICE OF SIZING AND VENDOR
- INVESTMENT PROTECTION & COST EFFICIENCY
- QUALITY & PERFORMANCE

SLIDES ON

HTTPS://WWW.MYBENKE.ORG/TALKS-AND-PUBLICATIONS/

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