

Software Defined Datacenter for SME

1. Executive Summary
2. Motivation
3. What it is and how it works
4. Business Case
5. Timeline
6. Succeeding in the Market

Micro-Node Servers



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Software Defined Datacenter for SME

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Micro-Node Servers



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Thomas-Krenn Micro-Node Servers

- **Business Case:** ~300k servers go EOL by Jan. 2020 in DACH, plus ~180k annual run rate business.
 - Conservative estimate: we capture 0.5% share → 1,700 units.
- **4 use cases Identified:**
 - 2-Node S2D Cluster (2x Datacenter)
 - 2-Node Replica Cluster (2x Standard)
 - 1-Node hybrid Cluster (1x Standard + Azure Site Recovery)
 - Single Server (1x Standard)
- **Designed-In:**
 - Admin Center integration
 - Azure Backup for all use-cases
 - Azure Site Recovery
- **Designed as appliances**

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Why we're doing this – Circumstances



40% market share in DACH 2018 for servers running Server 2008 R2
Server 2008
Server 2003
...and older.

ALL servers above in DACH will be EOL by January 2020. SBS alone is worth 60.000 replacements.



The hardware is between 6 and 12 years old.

Failures are imminent, spare parts unavailable.



Software-Defined Storage reduces CAPEX of high-availability by 30-50%.

HA is now possible for <20K€ and therefore affordable to SMEs.



Accelerating cloud adoption and acceptance in DACH.

But many legacy apps are not suitable for cloud-first solutions.

Hybrid cloud scenarios are becoming mainstream.



Everyone needs Data Protection. Microsoft and Thomas-Krenn currently have limited DP share of wallet.

Off-prem / cloud managed backup adds instant value and generates annuity.

SME
SMALL & MEDIUM ENTERPRISES

There doesn't seem to be a popular HA offering for <20K€ on the EMEA market today.

We will use this gap in the SME infrastructure market to attain 0,5% market share in units.

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Micro Nodes come in two easy Sizes, including 10GbE RDMA Networking

Basic



Advanced

- 8 Workloads / VMs total
- 6-24 TB usable, mirrored storage
- Dual mirroring optional

- 16 Workloads / VMs total
- 6-24 TB usable, mirrored storage
- Dual mirroring optional

Options under discussion – Feedback?

- Second, redundant Switch
- All-flash ultra-performance
- ...
- On-prem backup option
- 25GbE option
- ...

Micro Nodes come in two easy sizes, easily configurable online – no guesswork!

<https://www.thomas-krenn.com/en/products/application/software-defined-storage/s2d-micro-cluster/s2d-micro-cluster.html>

S2D micro-cluster node

• Windows pre-installation
• Optional S2D configuration according to best practices

Datasheet Versions Downloads

1. Basic configuration 2. Summary

Cluster selection (compute)

<input checked="" type="radio"/> Basic (2.2 GHz (turbo 3.00 GHz) 8-core & 64 GB RAM)	0.00
<input type="radio"/> Advanced (2.2 GHz (turbo 3.00 GHz) 16-core & 128 GB RAM)	2,670.00

Storage capacity

<input checked="" type="radio"/> 6 TB mirror (3 TB nested mirror)	0.00
<input type="radio"/> 12 TB mirror (6 TB nested mirror)	540.00
<input type="radio"/> 18 TB mirror (9 TB nested mirror)	1,370.00
<input type="radio"/> 24 TB mirror (12 TB nested mirror)	1,625.00

SAVE CHANGES **BACK** **CONTINUE WITH STEP 2**

7,320.00 €

Goods expected soon!

Step 1

THOMAS KRENN S2D micro-cluster: The next generation of SDS

English EUR Consulting +49 8551 9150 0 Support +49 8551 9150 500

My account 0 Article

1. Basic configuration 2. Service & Support 3. Summary

Active Directory

<input checked="" type="radio"/> Active Directory already exists in the environment	0.00
<input type="radio"/> LES LI3Z (details)	starting at 475.00

Switch selection

<input checked="" type="radio"/> 16-port RJ45 10 Gbit switch incl. 10x RJ45 network cables 2m	0.00
<input type="radio"/> 2x 16-port 8x RJ45 & 8x SFP+ redundant 10 Gbit switches with stacking functionality incl. 10x RJ45 network cables 2m & 2x SFP+ DAC cables 1m	2,785.00

Consulting service

<input checked="" type="radio"/> none	0.00
<input type="radio"/> Remote configuration by a Thomas-Krenn.AG consultant according to best practices incl. documentation (up to 4h configuration incl.) (details)	780.00

Software

License (More info)

<input checked="" type="radio"/> 2x MS Windows Server 2019 Datacenter, DE (OEM) (details)	0.00
-------------------------------------------------------------------------------------------	------

Software assurance

<input checked="" type="radio"/> none	0.00
<input type="radio"/> 2x MS Windows Server 2019 Datacenter 16-core, DE (Software Assurance 2 years)	6,399.00

Summary

Your current configuration

16,650.00 €

In stock!

energy needs

Maximum Power Input	British Thermal Unit
96 W	327 BTU/h

Energy cost calculator

Do you need help with your configuration?

Jennifer Boxleitner
Sales
+49 8551 9150 300

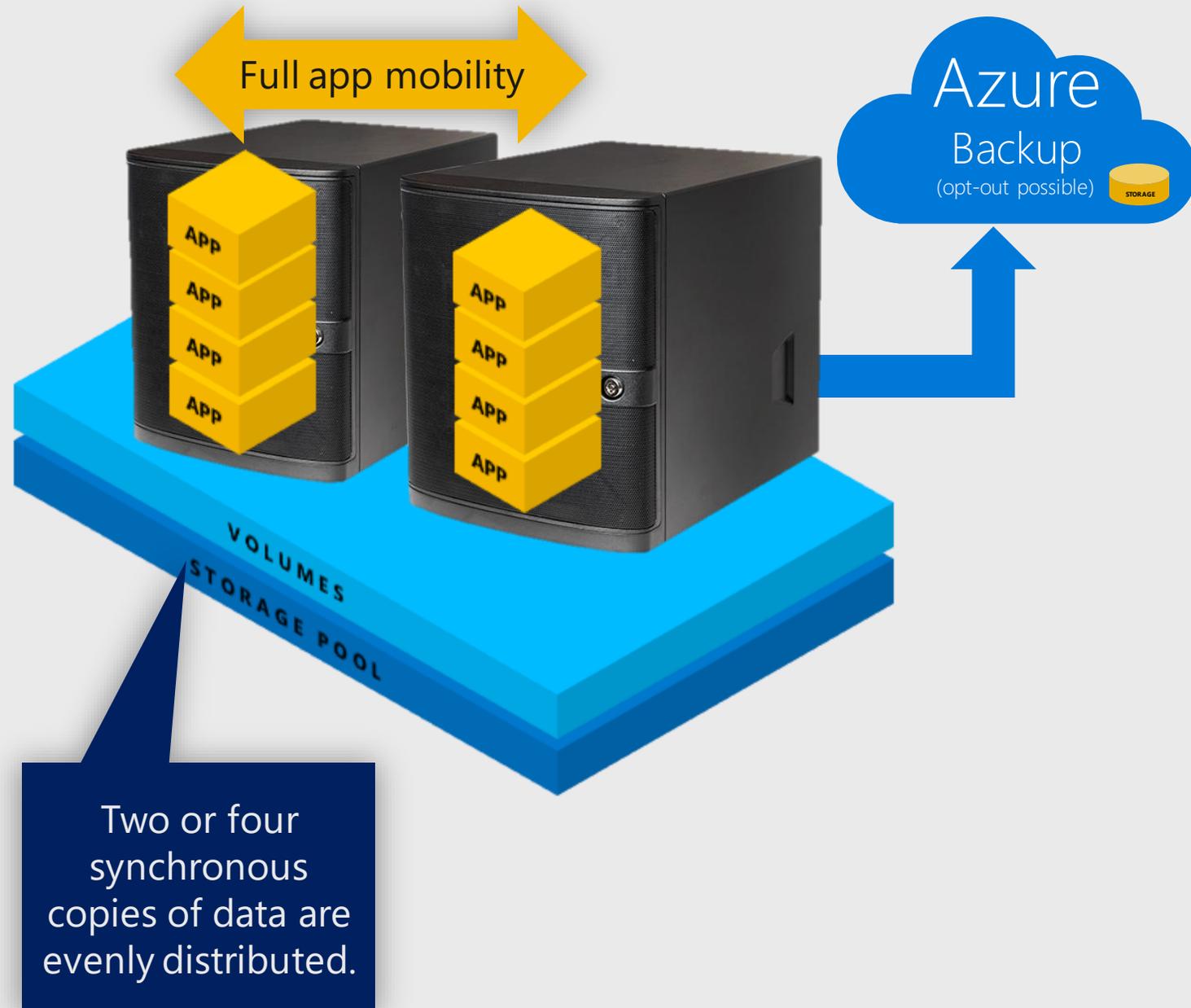


Step 2

Use Case 1: Dual-Node Cluster

2x S2D Cluster Nodes, 2x Server DC

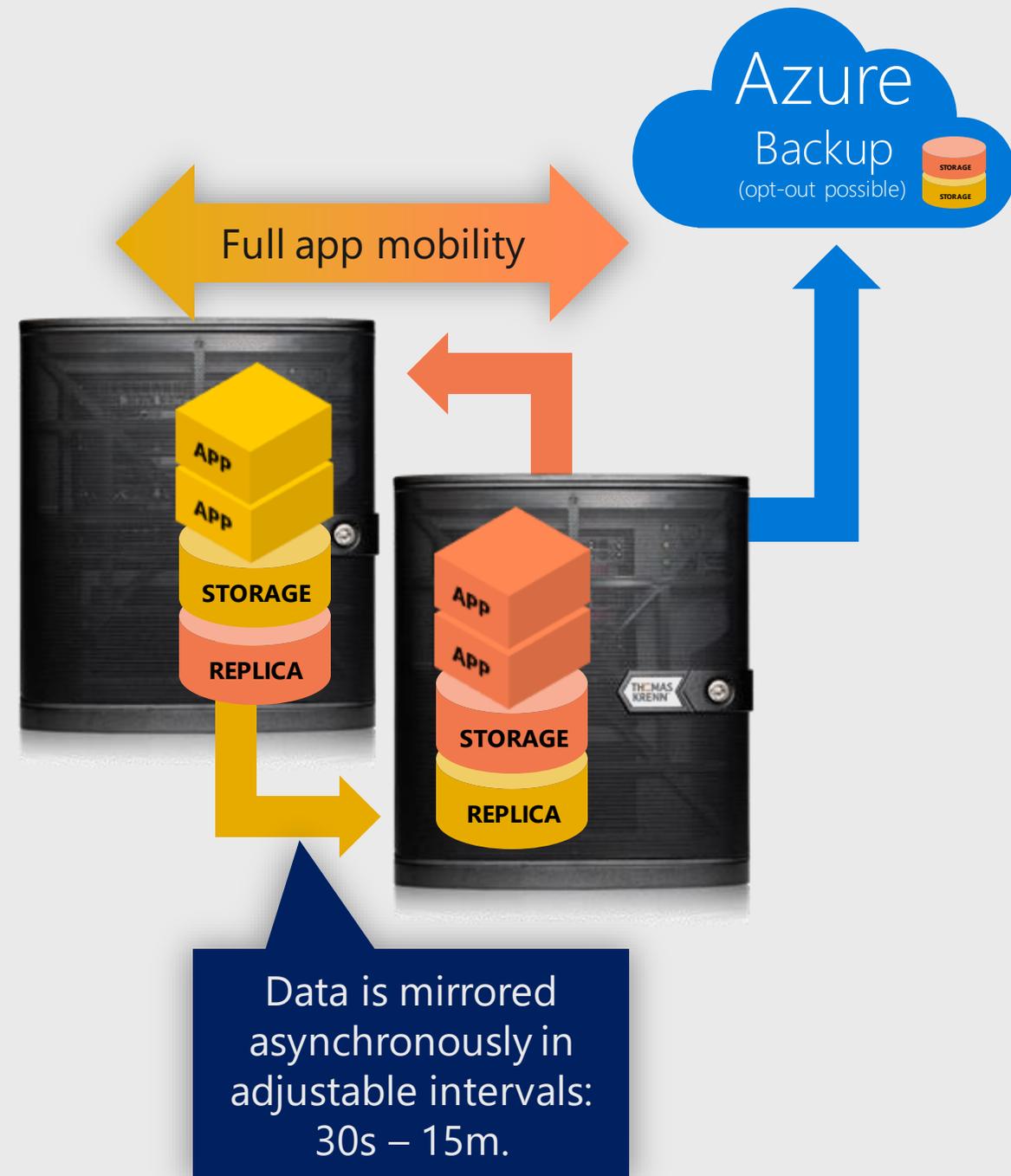
- Failed apps automatically restart within seconds or minutes.
- Guaranteed filesystem integrity.
- No single point of failure.
- 10 GbE iWARP networking allows low-cost, low-complexity stretching between rooms or buildings.
- MSRP starting at: 17k€, including Netgear prosafe switch
- Azure Backup and other services optional



Use Case 2: Cluster *Light*

2x Nodes, 2x Server Standard

- Availability provided through Hyper-V and/or Storage Replica
- App availability via manual app/VM failover – within minutes
- 10 GbE networking allows stretching between rooms or buildings
- Planned MSRP starting at: 13k€, including Netgear prosafe switch
- Azure Backup and other services optional

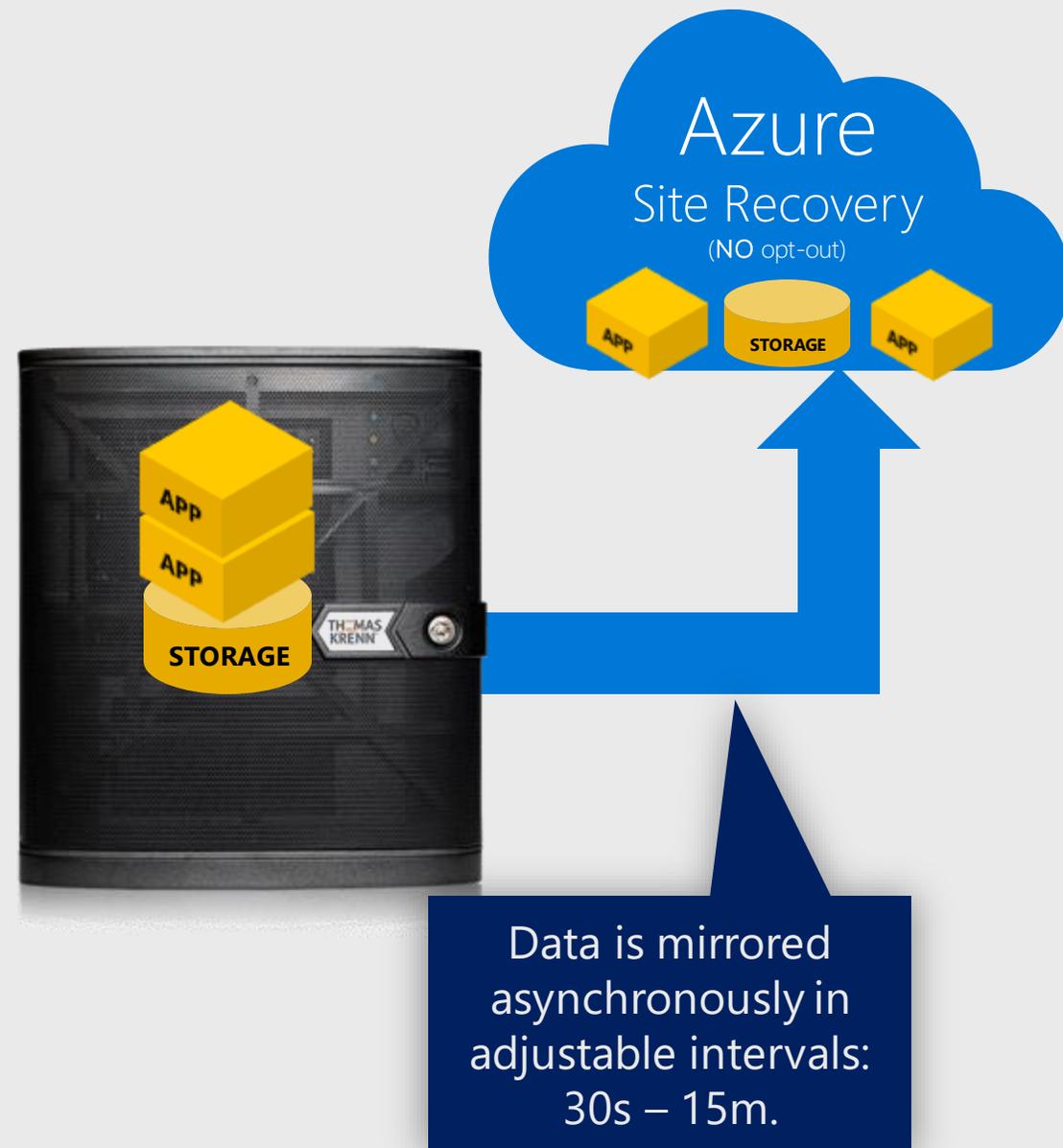


Use Case 3: Hybrid Cluster

1x Node, 1x Server Standard Licensed

- Availability provided through off-prem failover with Azure Site Recovery
- App availability via automatic app/VM failover – within minutes
- MSRP starting at: 6k€, plus Azure consumption

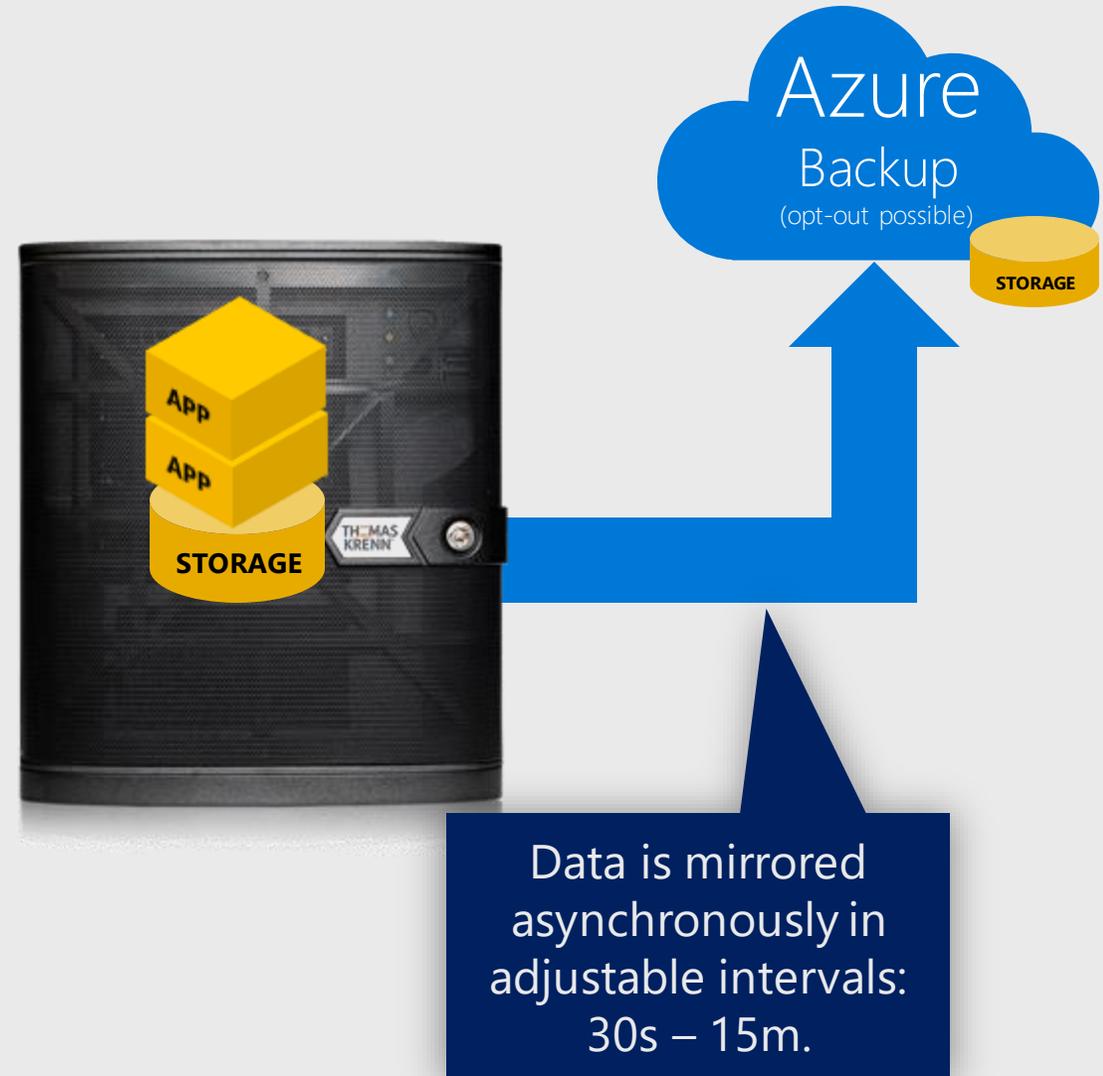
Caveat – significant technical challenges were identified: networking and transparent failover in grey-field scenarios. Use case delayed at least to 19CQ3.



Use Case 4: Single Server

1x Node, 1x Server Standard Licensed

- Plain vanilla.
- Azure Backup and other services optional



Use Case 5: Azure File Sync

2x S2D Cluster Nodes, 2x Server DC

Keep hot files on prem, and cold files in the cloud

- Sync multiple servers and locations
- Access shares from any SMB 2.1 client, such as Windows, MacOS and Linux.
- Improved user experience in low-bandwidth scenarios
- Supports most legacy apps



Windows Admin Center WAC provides:

- Easy on-prem configuration wizard
- Azure connectivity

Use Case 6: Azure Active Directory

2x S2D Cluster Nodes, 2x Server DC

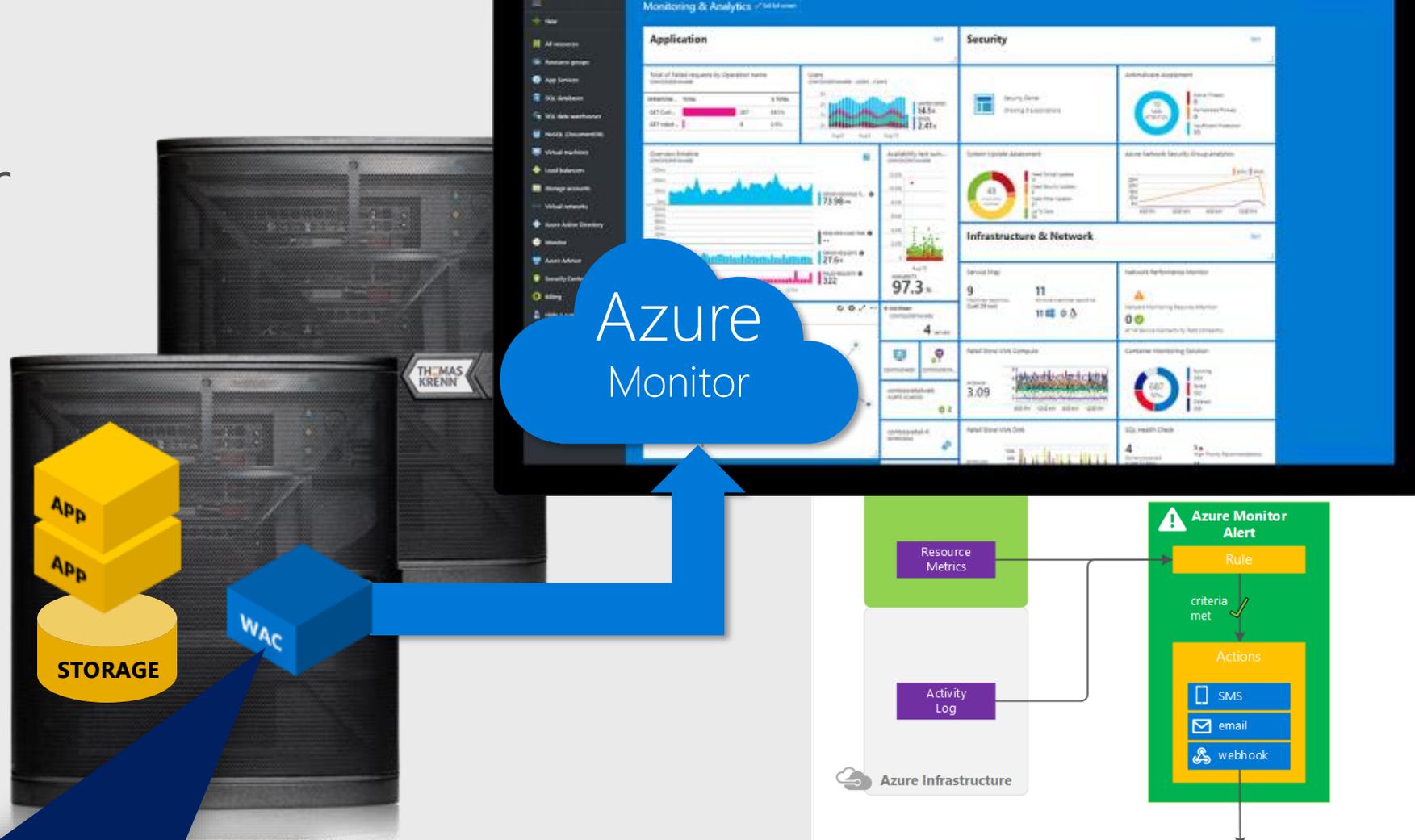
- Enable Multi-Factor-Authentication and Windows Hello for Business for on-prem services. This includes PIN, secure biometric and companion device login.
- Enable self-service password reset.
- Provide a single-sign-on for all organizational resources – any device, anywhere on the internet.
- Includes management for devices, guests, partners, contractors, customers and 3rd party apps outside of the organization.
- Enables basic management of virtually any device, anywhere on the internet, including Autopilot.



Added Value: Azure Monitor

Any config, any license

- Central, aggregated health dashboard
- Notification rules and actions
- Ideal for (managed) service providers



Windows Admin Center WAC Provides:

- Azure connectivity
- Event and performance data forwarding

Cost per VM

Micro Node

Advanced configuration

- 16 Workloads
- 36 Month Lifecycle
- 30k€ MSRP
- Standard Warranty
- Power consumption
(200W x 0,25€)

→ 55€ per VM/month

(licenses included)



Azure

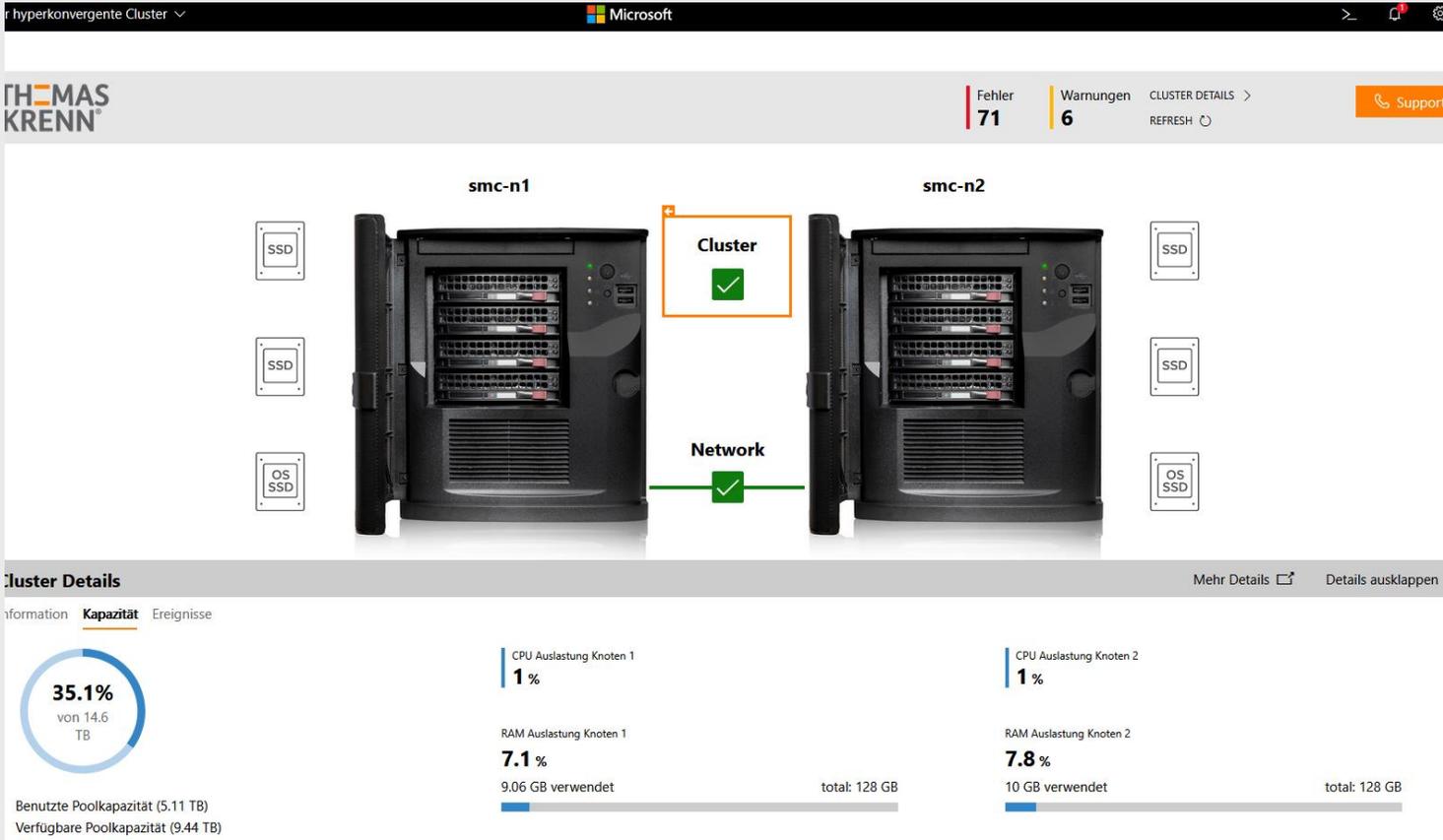
No high-availability,
limited legacy app
support

- B2MS Virtual Machine
- E20 SSD Storage
- Windows Server
- 3 year reserved
(includes 53% discount)

→ 79€ per VM/month

(as of March 23rd, 2019)

Predictable workloads are almost always cheaper on-prem!



Designed in: Windows Admin Center Extension

Standard Features

- Graphic, Browser-Based User Interface for Windows Servers and S2D Clusters
- Point-and-click Azure Integration

Thomas-Krenn Added Value: Ease of use

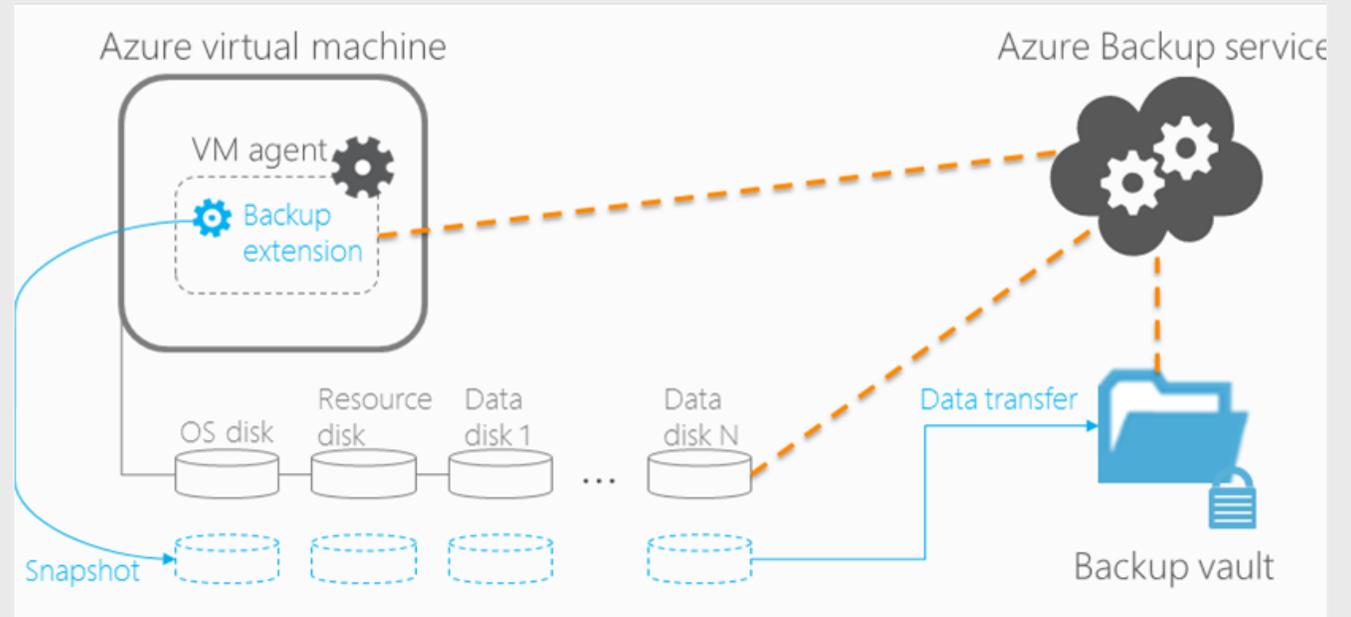
- Pre-installed and pre-configured – just log in
- Custom developed “extension”
- Thomas-Krenn branding
- Graphic visualization of servers and components
- Graphic visualization of degraded/failed hardware components
- “Phone Home” via email planned for 19CQ2.

Designed in: RDMA Network based on 10GbE with iWARP

- Traditional RDMA networks for S2D rely on DCB/RoCE, which is costly and complex
- Tests showed no significant performance penalty for 10GbE vs. typical 25GbE, further reducing cost.
- iWARP works with any Ethernet switches, reducing cost
- No special configuration required, i.e. no training, no mistakes
- Using proven Netgear ProSafe switches increases customer confidence



Designed in: Azure Backup



EVERYONE needs data protection.

Three copy best practice: 2x on-prem + 1x off-prem

Offers under discussion (Thomas-Krenn is not a CSP!)

- 12/24 months bundled in CAPEX
- Fair-use flat-rate
- Opt-out = 9/18 mo. CAPEX discount
- Annual OPEX with consumption adj.
- Unconditional flat-rate
- Consumption cap

Azure Backup as an Add-On

Veeam Backup Essentials

- 350€ MSRP 3 year license
- 4k€ backup-optimized micro-node appliance (ie. no SSD, dedup-enabled)
- 100W power consumption

→ **130€ per month**

Based on:

- Purchase prices / 36 months
- 0,25€ per KWh

Backup

- 6TB net data
- 4% daily churn
- 16 workloads
- 30 daily recovery points
- 6 weekly recovery points
- 12 monthly recovery points
- 1 year retention
- **34TB capacity required**

Azure Backup

→ **50€ per VM per month**

Based on:

<https://azure.microsoft.com/en-us/pricing/calculator/>

50€ per Azure-protected VM

Azure Site Recovery

Backup / Migration scenarios



Virtual or Physical machine to Azure (VMware & Hyper-v)



AWS VM to Azure



Azure to Azure



Designed in:
Azure Site Recovery

Ideal for customers with limited capital – but who still require HA.

Ideal for customers without the premises for HA.

Ideal for customers with off-prem Disaster Recovery needs.

Off-prem “node” is paid through OPEX/annuity.

Azure Site Recovery as an Add-On

On-prem Micro-Node Cluster

- 23k€ Advanced Micro-Node appliance, 6TB storage
- 200W power consumption

→ **470€ per month**

Based on:

- Leasing-Estimate at www.thomas-krenn.com
- 0,25€ per KWh

Disaster Recovery

- 6TB net data
- 4% daily churn
- 16 workloads
- **Replication mode only**
(failover operation not included)
- **16 Azure instances**
- **6TB unmanaged blob storage**
- **4.8TB virtual network traffic**

Azure Site Recovery

→ **51€ per VM per month**

Based on:

<https://azure.microsoft.com/en-us/pricing/calculator/>

51€ per Azure-protected VM

TCO: Micro-Node S2D Cluster vs. Hybrid Cluster

On-prem Micro-Node Cluster

- 17k€ Basic Micro-Node S2D cluster appliance, 6TB
- 200W power consumption

→ **360€ per month**

Based on:

- Leasing-estimate at www.thomas-krenn.com
- 0,25€ per KWh

Disaster Recovery

- 1.5TB net data
- 4% daily churn
- 4 workloads
- **Replication mode only**
(failover operation not included)
- **4 Azure instances**
- **1.5TB unmanaged blob storage**
- **1.2TB virtual network traffic**

Hybrid Cluster

- 6k€ for 1x Micro-Node, 6TB, 2x Windows Server standard
- 100W power consumption
- 204€ per month Azure SR

→ **390€ per month**

Based on:

- Purchase cost / 36 months
- 0,25€ per KWh
- 51€ per Azure-protected VM
- <https://azure.microsoft.com/en-us/pricing/calculator/>

Designed in:
**Azure Stack
HCI
Certification**

Certification ensures

- Solution visibility for (public) tenders
- Confidence for purchasers
- Best customer experience
- Direct support from corp

How to buy: Azure Stack HCI solutions



Certification provides

- Access to Microsoft S2D marketing activities
- Distinction from run-of-the-mill competitors
- Discoverability for customers new to S2D / SDDC

Designed in: Appliance OoBE

Micro-Nodes will reduce planning and deployment complexity through pre-install, quick-start guides and included remote deployment services.



This doesn't need a manual, or a college degree.
Why should we?

A long-exposure photograph of a road at night, showing bright, horizontal light trails from vehicles in shades of orange, yellow, and red. The road curves to the right, and a white dashed line is visible. The background is dark, with some distant lights and trees.

Designed in: >200K IOps Storage Performance

- Sustained, real-world performance assuming 70/30 R/W ratio and 8k blocks
- Latency at <2ms
- CPU load at ~35%
- Sufficient for 500,000 Exchange users
- Equivalent to 400 Azure E20 Disks
- Equivalent to 2,000 legacy SATA Disks
- 100K IOps at 0,9ms latency and 12% CPU

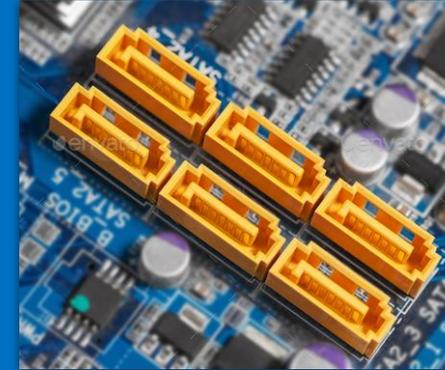
More designed in:



Cluster Shared Volume CSV
Cache tuned OoB
(1GB → 4GB)



Cluster Aware Updating
CAU enabled OoB



Onboard AHCI controller
reduces cost. No
performance impact.



Custom low noise fans



Chassis specifically chosen
and validated for Storage
Spaces Direct



No additional/external
domain controllers, no on-
prem witness

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Micro-Node Servers



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Why we're doing this – **run rate** potential

		Quarter ▾				
Values	OS	▾ 2017Q2	2017Q3	2017Q4	2018Q1	DACH Gesamt
Vendor Revenue (US\$M)	Linux	\$267,46	\$210,64	\$285,20	\$258,23	
	Others	\$0,33	\$0,36	\$0,00	\$0,00	
	Unix	\$4,58	\$5,18	\$10,63	\$6,64	
	Windows	\$420,00	\$435,73	\$561,91	\$575,63	
Units	Linux	43.446	31.510	40.149	36.767	151.873
	Others	1	2	0	0	
	Unix	612	690	1.244	934	
	Windows	73.216	72.554	84.468	73.230	303.469
Value (US\$M)	Linux	\$284,63	\$226,50	\$300,67	\$267,48	
	Others	\$0,34	\$0,38	\$0,00	\$0,00	
	Unix	\$4,76	\$5,38	\$11,37	\$6,89	
	Windows	\$444,72	\$459,63	\$595,40	\$607,45	
Total Vendor Revenue (US\$M)		\$692,37	\$651,91	\$857,74	\$840,51	
Total Units		117.275	104.757	125.861	110.932	458.825
Total Value (US\$M)		\$734,45	\$691,89	\$907,44	\$881,82	\$3.215,61

Buying rate per year:

- 30% of Linux is addressable, rest is hyperscale.
- 90% of Windows is Standard/Essentials, of that 50% is dual socket. Rest is addressable.
- TAM = 188,000 Units
- @0.5% market share for TK:
- **941 Micro-Nodes p.a.**

Why we're doing this – refresh/EOS potential

Region	Country	Windows Server (Net)			WS 2016			WS 2012			WS 2008			WS 2003 + Older			Windows Client			Linux			Other OS			
		FY18Q2	HoH	YoY	FY18Q2	HoH	YoY	FY18Q2	HoH	YoY	FY18Q2	HoH	YoY	FY18Q2	HoH	YoY	FY18Q2	HoH	YoY	FY18Q2	HoH	YoY	FY18Q2	HoH	YoY	
WW - 21	World	68.8%	-0.3	-1.4	0.6%	0.3	0.6	16.6%	0.6	1.3	31.4%	-0.6	-1.6	20.1%	-0.6	-1.7	-	-	-	29.8%	0.3	1.4	1.4%	0.0	0.1	
Americas	United States	67.6%	-1.4	-0.5	0.2%	0.3	0.6	14.7%	0.9	1.8	34.3%	-1.4	-1.7	21.0%	-0.9	-2.1	-	-	-	31.2%	0.6	2.0	1.9%	0.1	0.3	
	Canada	3.3%	-1.0	-0.3	0.3%	0.3	0.6	1.8%	-0.2	0.5	1.8%	-3.6	-2.0	20.3%	-0.8	-2.0	-	-	-	29.5%	0.0	0.4	1.5%	0.1	0.0	
	Mexico	0.8%	0.8	0.5	0.3%	0.6	0.6	18.2%	-0.2	0.5	30.4%	0.3	-0.5	19.5%	-1.3	-2.0	-	-	-	25.9%	0.5	1.5	1.7%	0.0	0.0	
BRIC	Brazil	67.6%	-1.4	-0.5	0.2%	0.3	0.6	14.7%	0.9	1.8	34.3%	-1.4	-1.7	16.2%	-0.7	-2.0	-	-	-	33.4%	0.9	2.2	1.3%	0.1	-0.1	
	India	72.3%	0.8	0.5	0.3%	0.6	0.6	18.2%	-0.2	0.5	30.4%	0.3	-0.5	18.2%	-1.0	-2.0	-	-	-	31.4%	1.4	1.7	1.1%	0.0	-0.1	
	China	72.3%	0.8	0.5	0.3%	0.6	0.6	18.2%	-0.2	0.5	30.4%	0.3	-0.5	23.2%	0.4	-0.1	-	-	-	27.5%	-0.7	-0.6	0.2%	-0.2	0.1	
Europe	Germany	62.9%	0.0	-0.5	1.3%	0.8	1.2	18.8%	1.1	2.2	26.3%	-1.1	-2.0	16.4%	-0.8	-1.9	-	-	-	35.4%	0.1	0.5	1.7%	-0.1	0.0	
	United Kingdom	71.6%	-1.0	-2.3	0.3%	0.3	0.3	1.7%	0.3	0.3	30.7%	0.3	0.3	21.7%	0.3	0.3	-	-	-	27.4%	1.0	2.3	1.0%	0.0	0.0	
	Denmark	60.4%	0.7	-0.9	2.3%	0.8	1.5	18.4%	1.1	1.4	25.2%	-0.8	-2.5	14.4%	-0.5	-1.3	-	-	-	39.1%	-0.5	0.9	0.5%	-0.2	0.0	
	Netherlands	68.3%	1.0	0.6	1.0%	0.4	0.9	1.9%	0.4	1.8	28.9%	0.1	-0.6	20.6%	0.1	-1.5	-	-	-	29.4%	-0.6	-0.5	2.3%	-0.4	0.0	
	Poland	60.9%	-0.9	-0.3	0.7%	0.4	0.7	6.0%	1.2	2.1	25.7%	-1.5	-1.7	18.5%	-0.9	-1.3	-	-	-	37.0%	1.0	0.3	2.1%	-0.1	0.0	
	Sweden	67.4%	-0.9	-1.6	1.2%	0.6	1.2	22.2%	0.8	1.3	29.7%	-0.1	-0.8	14.2%	-2.1	-3.2	-	-	-	31.5%	0.9	1.6	1.0%	-0.1	0.0	
	Switzerland	66.4%	-0.4	-1.1	2.4%	0.2	2.1	21.2%	0.9	2.1	29.6%	-0.9	-3.8	13.3%	-0.6	-1.5	-	-	-	29.0%	0.4	1.4	1.3%	0.0	-0.3	
	France	65.8%	0.4	-0.6	0.6%	0.6	1.3	13.6%	1.1	1.3	13.6%	1.1	1.3	13.6%	1.1	1.3	-	-	-	1.9%	-0.1	-0.1	2.5%	-0.2	-0.7	
	Italy	56.6%	0.0	-5.6	0.7%	0.7	1.2	11.4%	1.2	1.2	11.4%	1.2	1.2	11.4%	1.2	1.2	-	-	-	3.4%	-0.1	-0.3	1.0%	0.1	0.1	
	Spain						1.0					1.0														
	Turkey						0.0					0.0														
Asia Pacific + S. Africa	Japan						0.6				0.6											1.1%	-0.2	-0.4		
	Korea						-				-											-	-	-		
	Australia						0.3				0.3											1.5%	0.0	0.0		
	South Africa	75.1%	-0.5	-0.4	1.1%	0.5	1.0	20.4%	1.0	1.0	20.4%	1.0	1.0	0.9%	0.0	0.1				0.9%	0.0	0.1				

Market Share Server 2016 + 2019:

- Negligible

First 2012 HW going EOS:

- Share unknown, but contributes too!

Physical Systems EOS in FY18 Q2:

- 1.7M units installed base between 1-5 years old in Q1 2018 (see previous)
- 40% → 700k in market older than 6 years
- 90% of that is Standard/Essentials, of that 50% dual socket. Rest is addressable:
- 315k in Micro-Nodes performance class**

Source: MTS Server Model, FY18 Q2. Here, Germany only.

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19CQ1

- UC1 (Micro Cluster) micro tower

19CQ2

- Azure Stack HCI certification for micro tower configs
- UC2 (Cluster *Light*) micro tower (July 1)
- Hybrid Azure Attach: Cluster Quorum, Mgmt, Alerts
- Fully Self-Contained Design

19CQ4

- UC4 (Micro Node)
- CSP enablement

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Why do you want this and not a standard Server?

Standard Servers will be our main „competitors“!

1. High availability reduces planned downtime → ZERO.
2. High availability reduces unplanned downtime dramatically, due to NoSPOF design.
3. Windows updates automatically install without service interruption – at any time.
4. Automatic, non-disruptive updates mean no more night or weekend shifts.
5. Nodes can be stretched apart for location and power redundancy too.
6. During regular uptime of 99.9% for Windows clusters, customers can over-commit the system by up to 100%. Ideal for low-priority, non-critical or test & dev workloads.
This further reduces the cost per workload.
7. No more licensing guesswork. Included datacenter licenses cover all eventualities.
8. Move your existing Linux workloads to micro-nodes and extend their lifecycle by years – refresh everything, but change nothing!

Any customer with more than 1M€ revenue per year.

Windows stand-alone server → 98% availability (~7 days downtime p.a.)
2% downtime → 2% revenue loss → **20,000 € lost p.a.**

Windows cluster → 99.9% availability (~8 hrs down p.a.)
→ x20 times less downtime
0,1% downtime → 0,1% revenue loss → **1,000 € lost p.a.**

Difference = 19,000 €,
which is almost the total CAPEX cost of a micro-node cluster.

Who needs
this?

**Target customers break even after 12-14 months.
ROI after 3 years approaches 300%.**

General Target Customer Profile

1. Makes more than 1M€ revenue per year
2. Mainly stationary / on-prem workplaces
3. Poor internet connectivity (<16 Mbit)
4. Has large data sets
5. Current server is EOL / EOS.
Important: Target hardware is EOL – software never goes EOL!
6. New virtualization platform requested
7. Low-latency and/or high-bandwidth apps required:
IoT edge computing applications
Legacy client/server apps
8. Has clearly expressed on-prem business needs
- 9. Linux customers looking for a platform refresh**

Identified, Prioritized Vertical Use Cases

- Healthcare: Doctors / Clinics
- Lawyers
- Tax-consultants (Steuerberater)
- Public: Municipal Administrations
- Retail: Franchises, "Store in a Box"

Thank You



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