Fremtidens datasenter

Espen Stokke – Lenovo

20. September 2018

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Today's Business Realities

Stay Ahead

Innovate or die

Transform Now

Adapt and modernize

Do Everything Faster

Move at the speed of business

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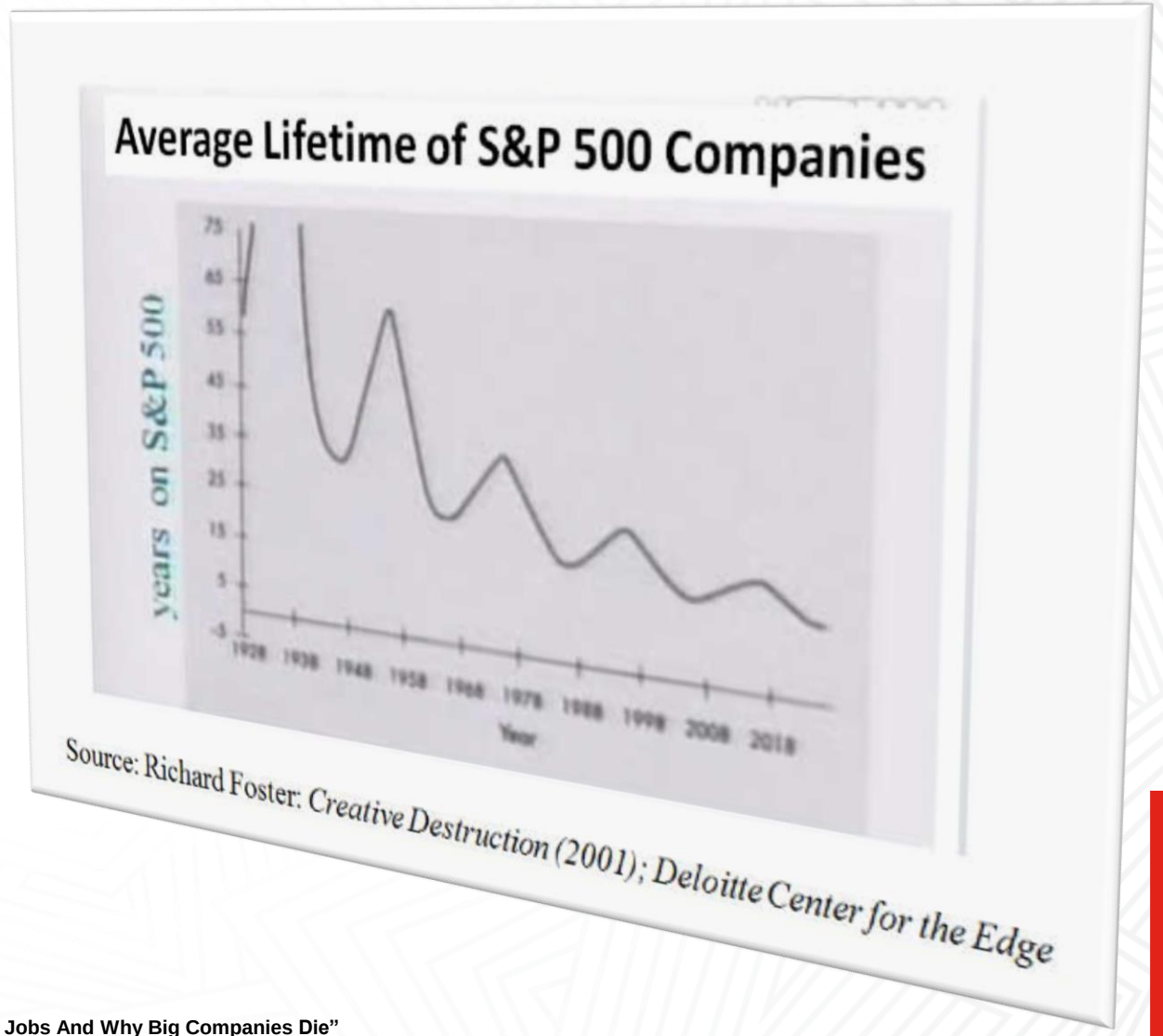
It's More Difficult to Add Value Than to Cut Costs

"Half a century ago, the life expectancy of a firm in the Fortune 500 was around 75 years.

Now it's less than 15 years and declining even further."[1]



1 Steve Denning "**Peggy Noonan On Steve Jobs And Why Big Companies Die"** http://www.forbes.com/sites/stevedenning/2011/11/19/peggy-noonan-on-steve-jobs-and-why-big-companies-die/#a0e31f73e579

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The Need to Transform – UBER

Uber and Lyft have devastated L.A.'s taxi industry, city records show…
LA Times, April 14, 2016

Judge rules on taxi industry lawsuit: Compete with Uber or die
Crain's New York Business, Sept. 9, 2015

Uber Has Pretty Much Destroyed Regular Taxis in San Francisco
Time, Sept. 18, 2014

Proof that Uber is obliterating New York City's taxi industry
Business Insider, Aug. 21, 2015

UBER

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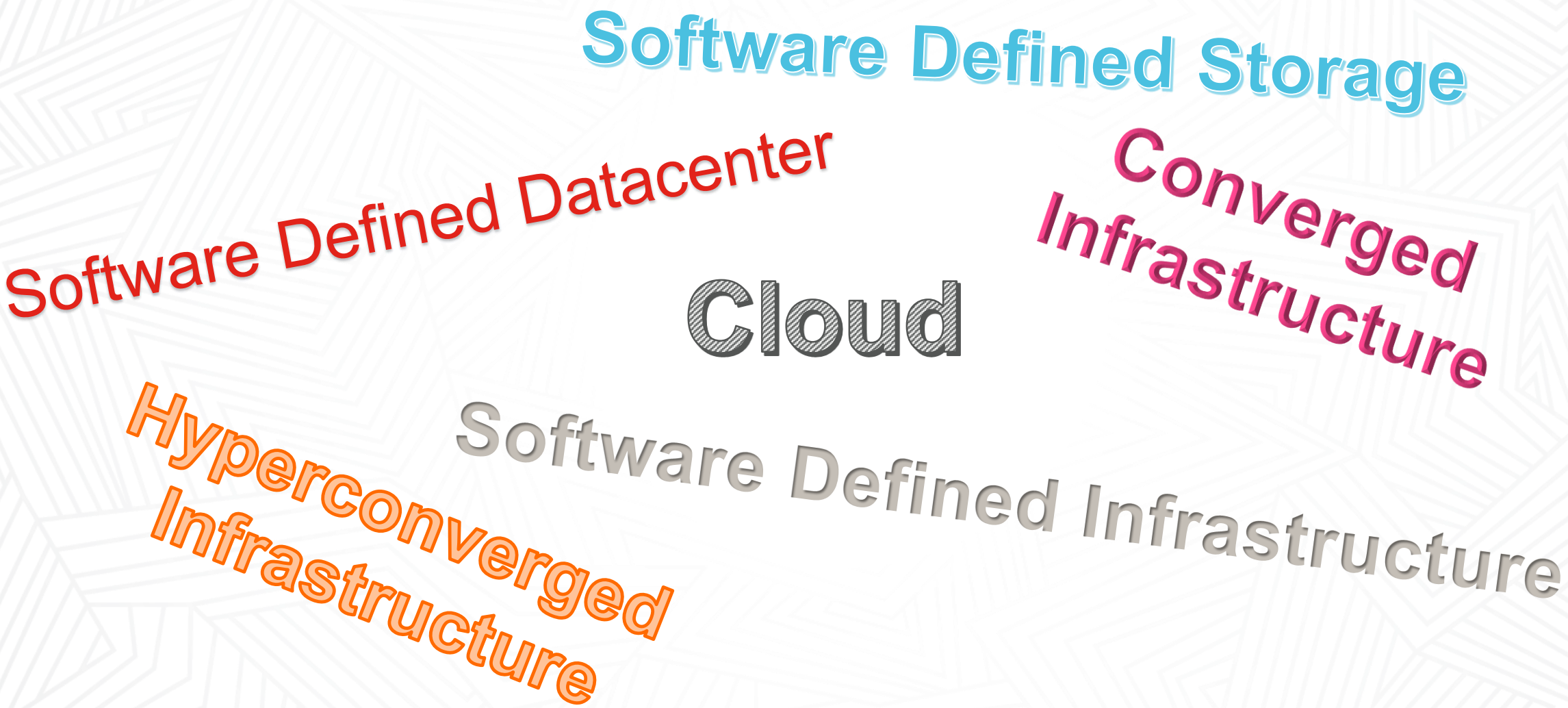
«Nye» begreper



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Sofware definering ?

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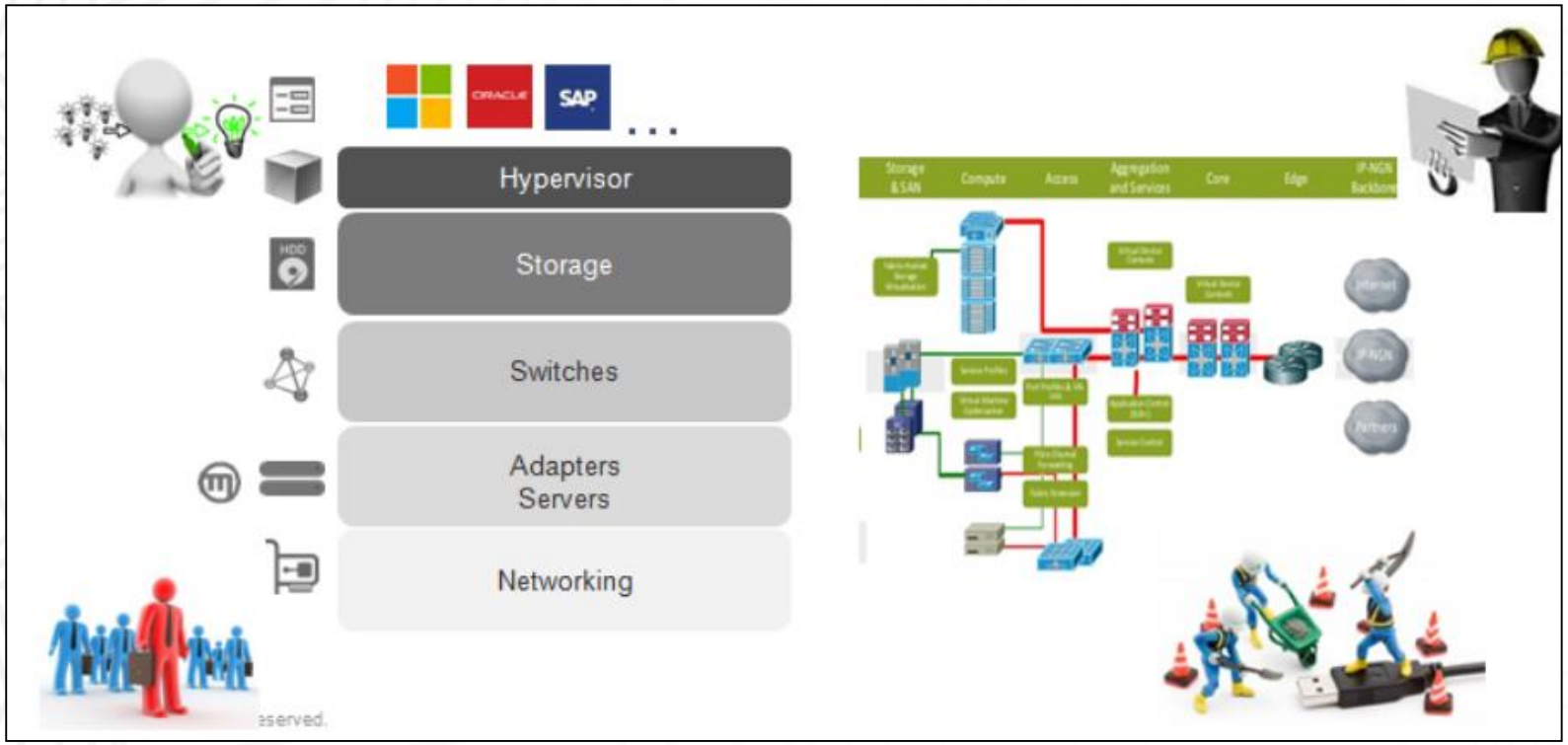
Software definering på datarommet



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For your Software Defined Future

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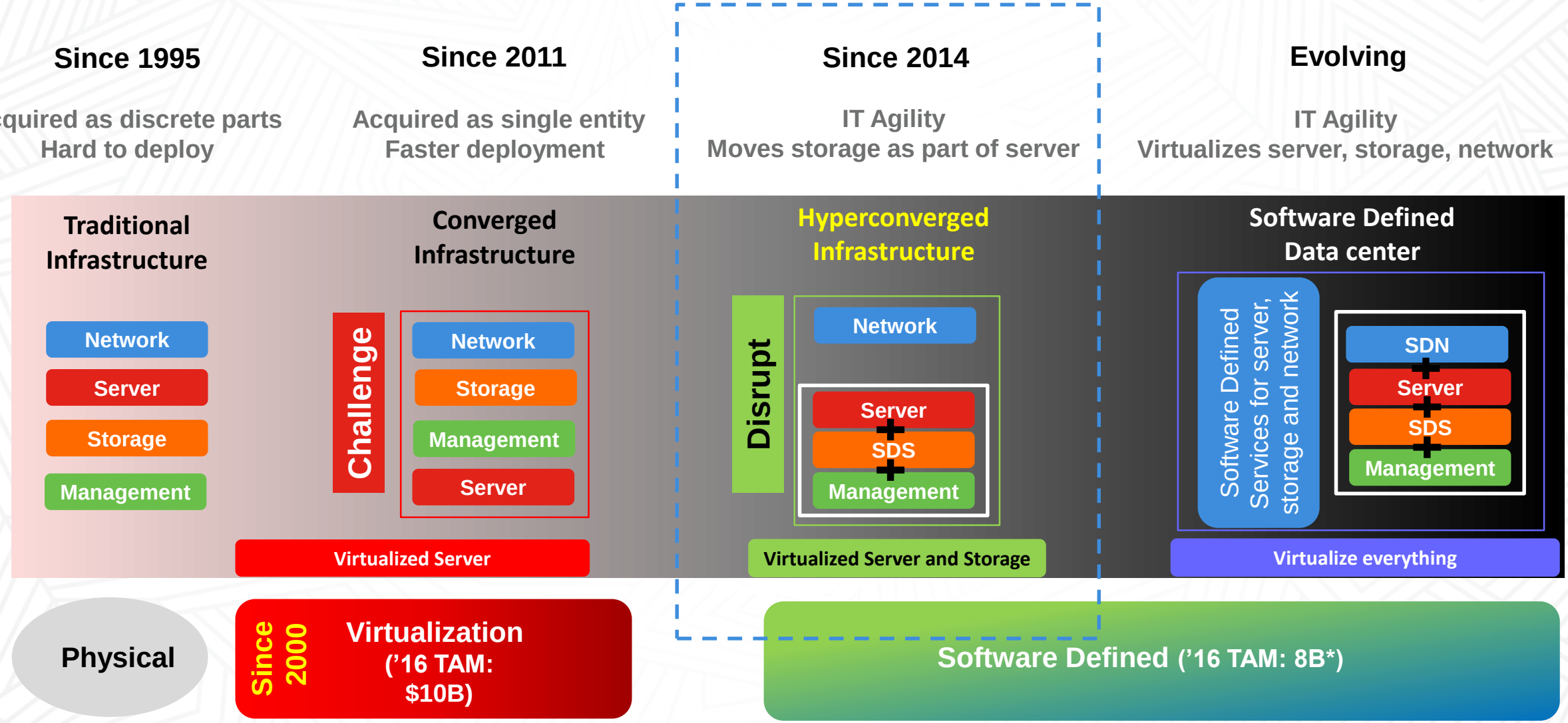
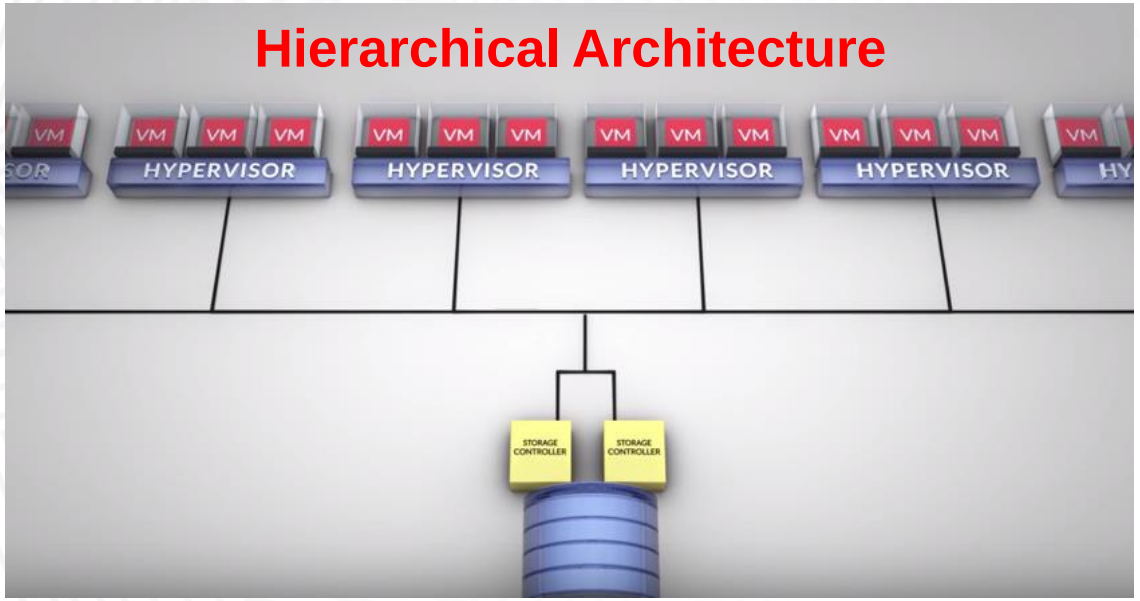
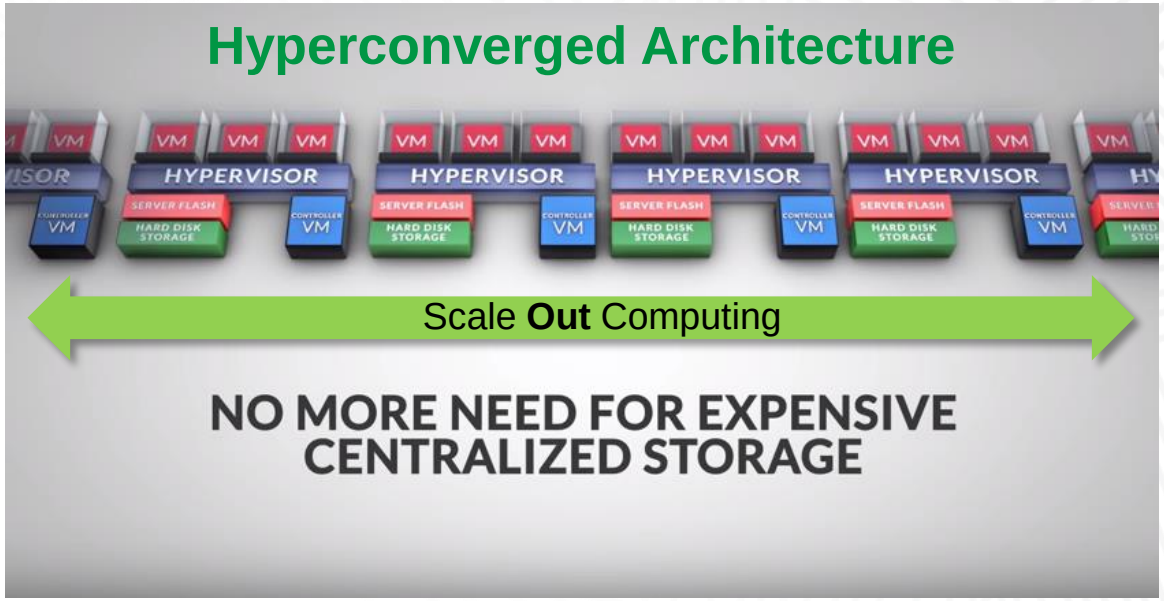
Data center infrastructures are transforming as people look to the cloud for agility



*Includes Tier 1 hyperscale

HYPERCONVERGED BEATS CENTRAL STORAGE





Infrastructure:

- LAN Switches
- SAN Switches
- Central Storages
- SVC
- Server Nodes

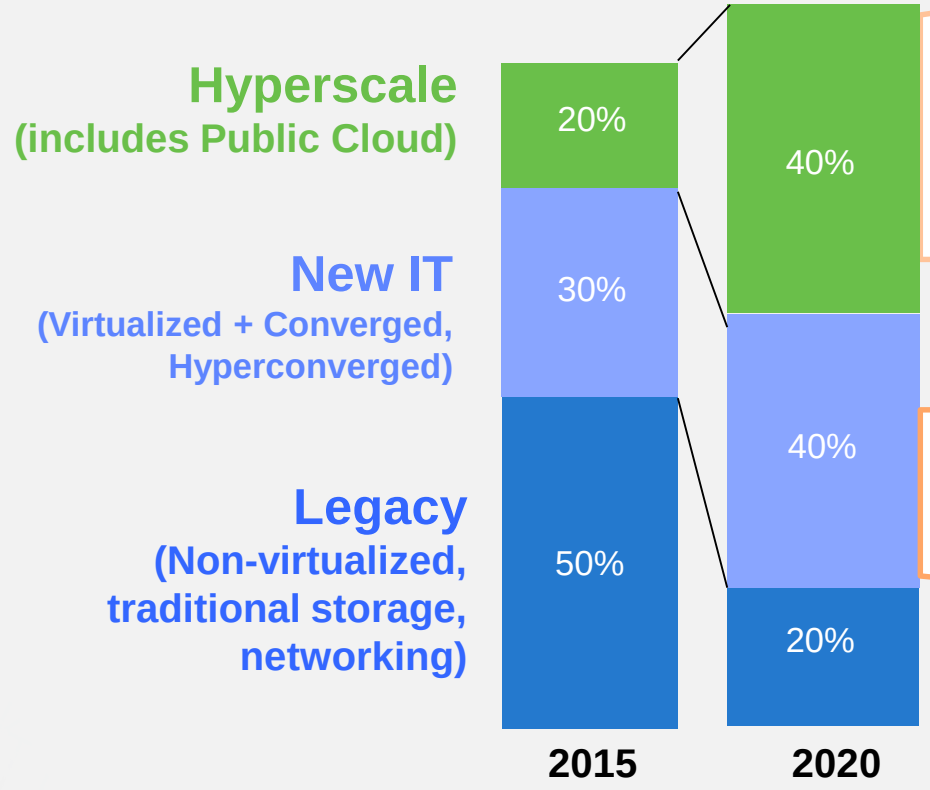
Infrastructure:

- LAN Switches
- Server Nodes

Data Center IT is Changing at a Rapid Pace

- Public cloud has changed how IT infrastructure is deployed
- Much bigger focus on Private Cloud and being cost competitive against Public
- Converged and Hyperconverged trends are going to accelerate

Enterprise Workload Deployments



Leading IaaS / PaaS Providers

amazon web services	▪$2.8B (Q2, 2016) ▪56% YTY growth
Aliyun Alibaba Cloud Computing	▪$165M (Q2, 2016) ▪175% YTY growth
Microsoft Azure	▪$800M (Q2, 2016) ▪102% YTY growth
Google Cloud Platform	▪$900M (Q4, 2015) ▪65% YTY growth

New IT Segment View

Converged	▪CAGR 5.5%
Hyper Converged	▪CAGR 39.5%
Virtual Server	▪CAGR 14.1%
New IT (Total)	▪CAGR 11.1%

- From 2016-2020
- Open Stack not included.

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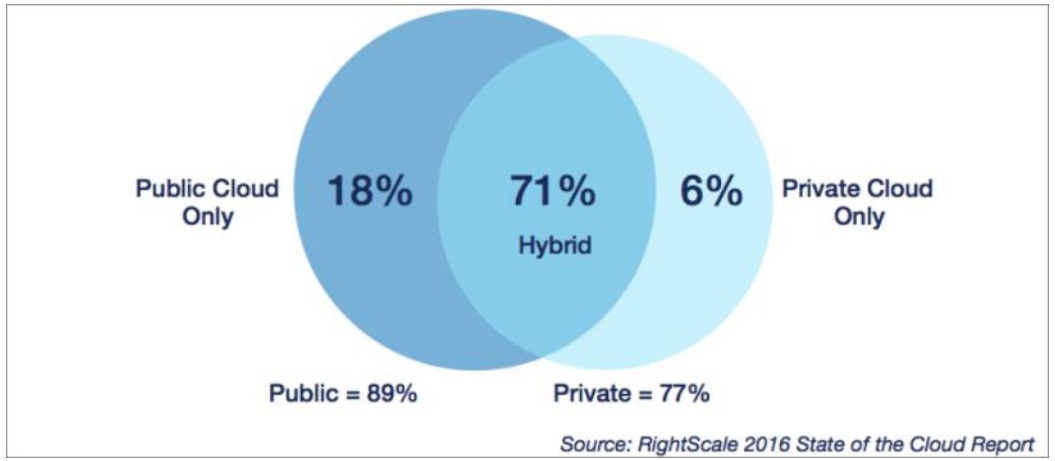
Most enterprises are adopting a hybrid cloud strategy

71% of enterprises adopt hybrid cloud



Microsoft: *"Cloud is a Model not a Place"*

Nutanix: «The Enterprise Cloud platform»

VMWare: "Run your datacenter like the cloud and Seamlessly extend your data center to the hybrid cloud"

Different is Better

The Future-Defined Data Center

ThinkSystem

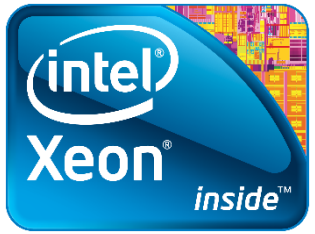
Server, storage, & networking solutions

«Build it!»

ThinkAgile

Next Generation IT

“Use it!”



Lenovo

Lenovo ThinkSystem

ThinkServer

System x

TD350

RD650

RS160

TS150

RD450

RD350

RD550

TS460

x440

x3850 X6

x3250 M5

x880

x3550 M5

x3650 M5

x3100 M5

x3500 M5

x3950 X6

x480

x3750 M4

ThinkSystem

x3250 M6

Lenovo

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ThinkSystem

14
SERVER PLATFORMS
WORLD RECORD PERFORMANCE & RELIABILITY

7
STORAGE OFFERINGS
REVOLUTIONIZED ECONOMICS

5
NETWORK SWITCHES
OPTIMIZED CLOUD PERFORMANCE

A Strong Foundation

#1

Customer Satisfaction

In the latest TBR survey (1H 2017), Lenovo was #1 for the 7th consecutive study going back to January 2015, and in 23 of 29 studies since 2H 2009. Also, lead in 22 of 22 satisfaction attributes in latest survey.

#1

x86 Server Reliability

#1 in ITIC Reliability Survey for 4 ½ years running.

#1

Microsoft SQL 2017 Performance

SR650 TPC-E Performance and Price/Performance[1] and SR950 TPC-H[2]

#1

SAP HANA TCO

SAP runs their SAP on Lenovo. Lenovo has the lowest TCO with X6 systems providing up to 31% lower cost over three years for SAP HANA.

#2

TOP500 HPC Vendor

Lenovo is the fastest growing TOP500 HPC vendor worldwide and ranks 2nd in the number of fastest systems.

58

Current World Record x86 Benchmarks

Lenovo enables faster performance and data analysis for mission critical applications.

#24

Gartner Supply Chain

Of 300 companies over $12B rev across industries recognizing supply chain leadership and best practices.

Lenovo ThinkSystem RackSwitch

DC Access / Aggregation ToR switches
Designed for cloud scale networks
VLAG, Telemetry and CNOS

Applications:
Aggregation, HPC, Big Data, Financial Services
Open and interoperable

10G Base-T

Lenovo ThinkSystem NE1072T/1032T RackSwitches

- 48x 10GBase-T, RJ45 ports, 6x 40GbE QSFP+ port
- 24x 10GBase-T, RJ45 ports, 8x 10GbE SFP+ ports
- Ansible, Nutanix Prism, OpenStack, VMware Log Insight, Python, REST, Telemetry APIs
- ZTP (Zero Touch Provisioning)
- ONIE (Open Network Installation Environment

10G Ethernet

Lenovo ThinkSystem NE1032 RackSwitch

- 32x 10GbE SFP+ ports
- Open cloud architecture with partner ecosystem
- Hybrid cloud data centers

25G/100G Leaf / Aggregation

Lenovo ThinkSystem NE2572 RackSwitch

- 48x 10GbE SFP+ or 25GbE SFP28 ports, 6x 40GbE QSFP+ or 100GbE QSFP28 ports
- East / West CLOS network designs
- Open cloud architecture with partner ecosystem

100GE Spine

Lenovo ThinkSystem NE10032 RackSwitch

- 32x 100GbE QSFP28 or 40GbE QSFP+ ports
- ZTP (Zero Touch Provisioning)
- ONIE (Open Network Installation Environment)

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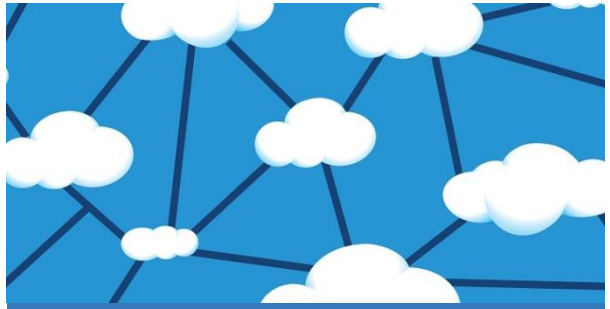
Lenovo Cloud Networking Operating System (CNOS)



Cloud Scale

- Modern OS built from ground-up for cloud
- Easily scale to accommodate East West traffic growth in DC

Application Aware

- Integrated and validated with existing DC ecosystem: VMware, MSFT Azure, OpenStack
- VM aware automates VM provisioning and VLAN assignments for Nutanix HX deployments

Open

- OpenStack, APIs and Protocols
- DevOps Automation with Ansible

Efficiently run business critical applications with modern modular software

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CNOS Ecosystem Integration

vRealize Suite monitor and automate
- vRealize Log Insight reduces network problem triage and time to repair
- vRealize Orchestrator accelerates network automation

Openstack Neutron
- Neutron automates network operations with open and centralized control
- Dynamically add or remove VLANs on Lenovo switch ports to reduce opex and downtime

XClarity data center management
- Auto discover and track Lenovo switch inventory centrally
- Monitor events and alerts with Call Home support to reduce network downtime
- Manage firmware levels centrally, reducing network maintenance opex

Ansible open source devops orchestration
- Simple human readable automation simplifies network configuration and increases uptime
- Easy implementation with Lenovo modules included and distributed in Ansible v2.3 +
- Additional Lenovo networking roles on Ansible Galaxy partner website

Nutanix Prism
- VM provisioning automation for Lenovo Nutanix deployments
- Automatically updates physical switches based on virtual changes
- Increased security, uptime and efficiency

Ganglia Monitoring System - scalable, open source, distributed monitoring system
- Analytics for Lenovo CNOS networking devices
- Telemetry statistics for real QoS reporting and analytics
- Real-time troubleshooting and proactive health assessment planned

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It Began 30 Years Ago, Leading to Next-Gen Leadership

PC Server 320

Netfinity

System x™

xSeries

Flex System

BladeCenter

iDataPlex

BLADE NETWORK TECHNOLOGIES

NEXTSCALE

X6

Reliability
Scalability
Performance

Building on Leadership

ThinkSystem

Server Storage Networking
performance / flexibility / reliability

ThinkAgile

Software Defined
simplicity / control / agility

ThinkServer

Lenovo Storage

Velocity
Value / Volume
Supply chain

COMPLEXITY → SIMPLICITY

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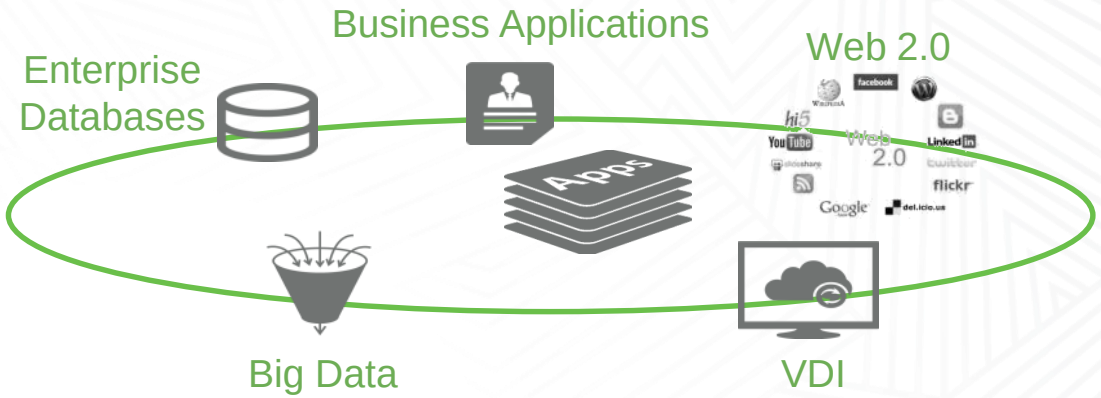
Lenovo ThinkAgile

ThinkAgile Vision

ThinkAgile
Automation
Analytics
Services

Mixed Workloads



Mixed Environments

Multiple Locations

Lenovo Infrastructure

Lenovo ThinkAgile HX

NUTANIX

HX Appliance Solutions for the Data Center

NUTANIX

- **Simplify IT infrastructure**
- **Reduce costs and accelerate time to value**
- **Greater reliability**

1. https://www.lenovo.com/images/products/system-x/pdfs/white-papers/esg_lenovo_hx_series_roi_wp.pdf
2. ITIC

Nutanix Prism – Single management

Lenovo VMware Solutions

vSAN and VCF Ready Nodes

Build Your Own

- Use Lenovo/VMware certified HW configurations
- Integration done by customer
- Self installed and maintained

ThinkAgile VX Series Appliance

Focus on your business not on infrastructure

- **Lenovo Tested, Qualified, Proven**
  - Built and tested by Lenovo with only vSAN certified components.
- **Lenovo Delivered, Installed, Configured**
  - Professional Services leave you with a hyperconverged solution that is ready to go
- **Lenovo ThinkAgile Advantage**
  - Backed by a direct line to 2nd level support that won't hand you off

Available Q4 2017

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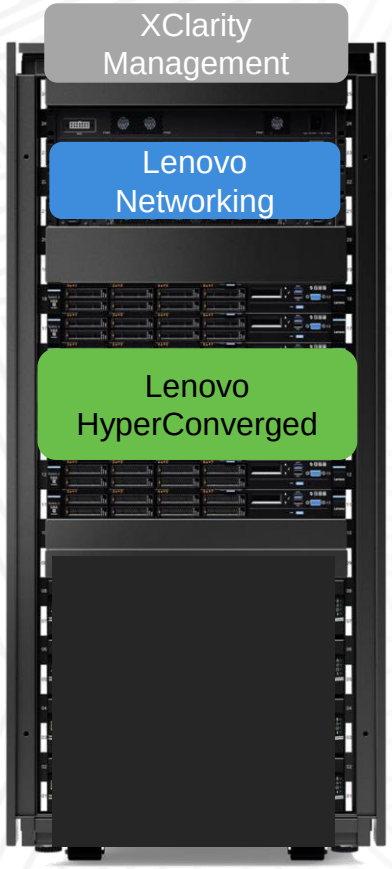
Lenovo ThinkAgile SX

Lenovo Next Generation IT for Software Defined Infrastructure



Pre-installed, configured, & shipped with all Lenovo infrastructure components

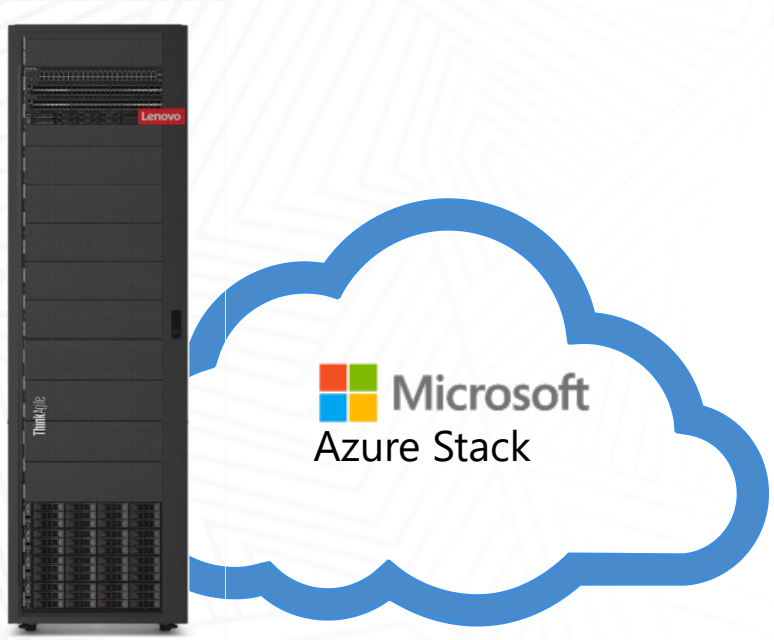
Lenovo Software Defined appliance, **Lenovo** Networking, **Lenovo** Infrastructure Management, **Lenovo** Single Point of Support

One-stop solution for your infrastructure needs

- Software Defined building block in a box: fully integrated, tested, racked
- Ready to deploy workload in **hours**, not weeks
- **Reduce support time** with Lenovo Single Point of Contact

Ignite Transformation with

ThinkAgile SX for Microsoft Azure Stack



Simplified, Consistent Hybrid Cloud

- Rack-scale, pre-integrated turnkey solution ready to deploy in hours
- On-premises Azure cloud services
- Enriched lifecycle management

Increased IT Agility

- Ships up to 2x faster than alternative solutions
- Professional installation

Transformative Support

- Lenovo has co-innovated with Microsoft for more than 20 years
- Reduce support time with single point of contact

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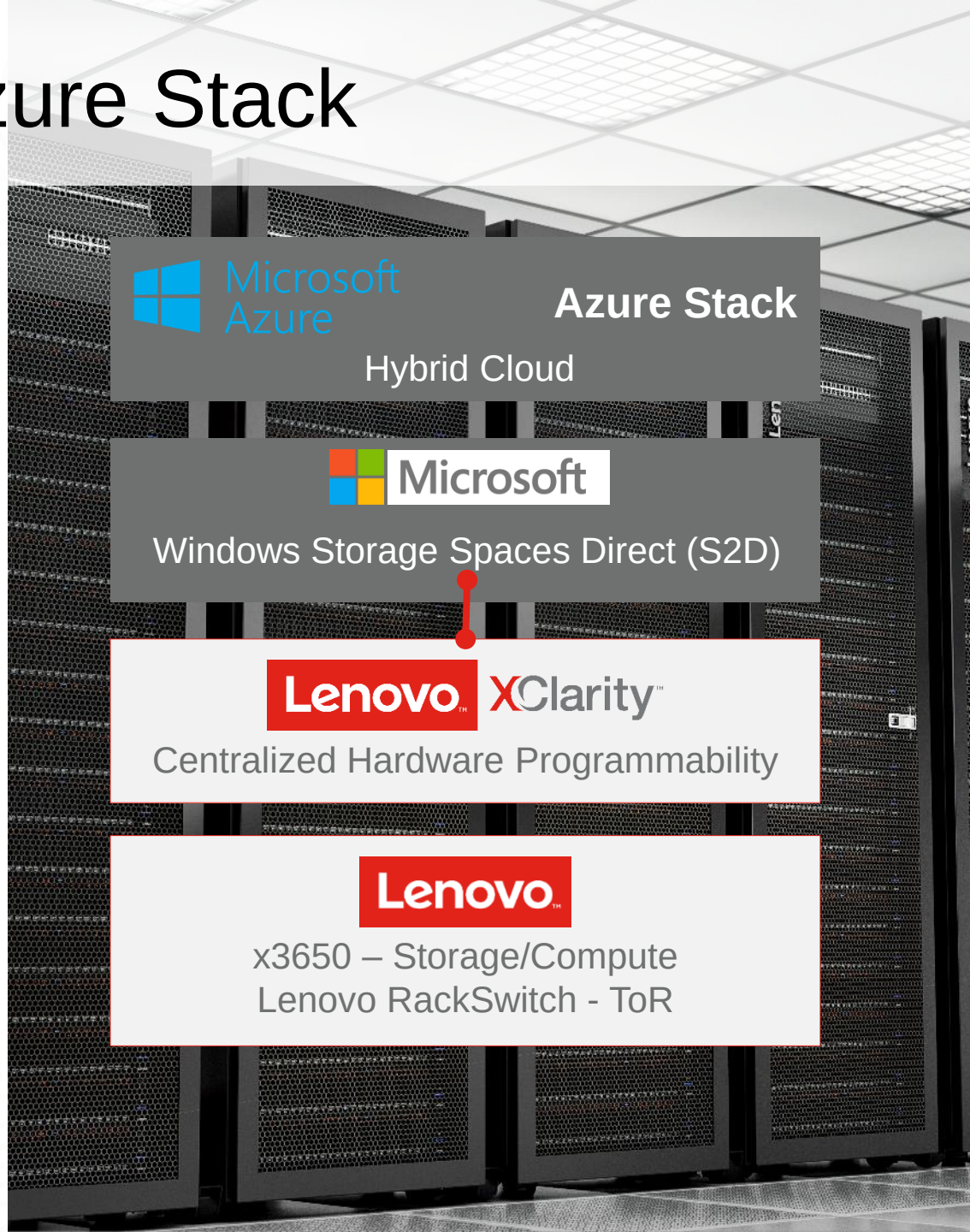
Lenovo Integrated Microsoft Azure Stack

Build Applications On-Premise and Burst On Demand to Azure Cloud

Lenovo

Microsoft Azure

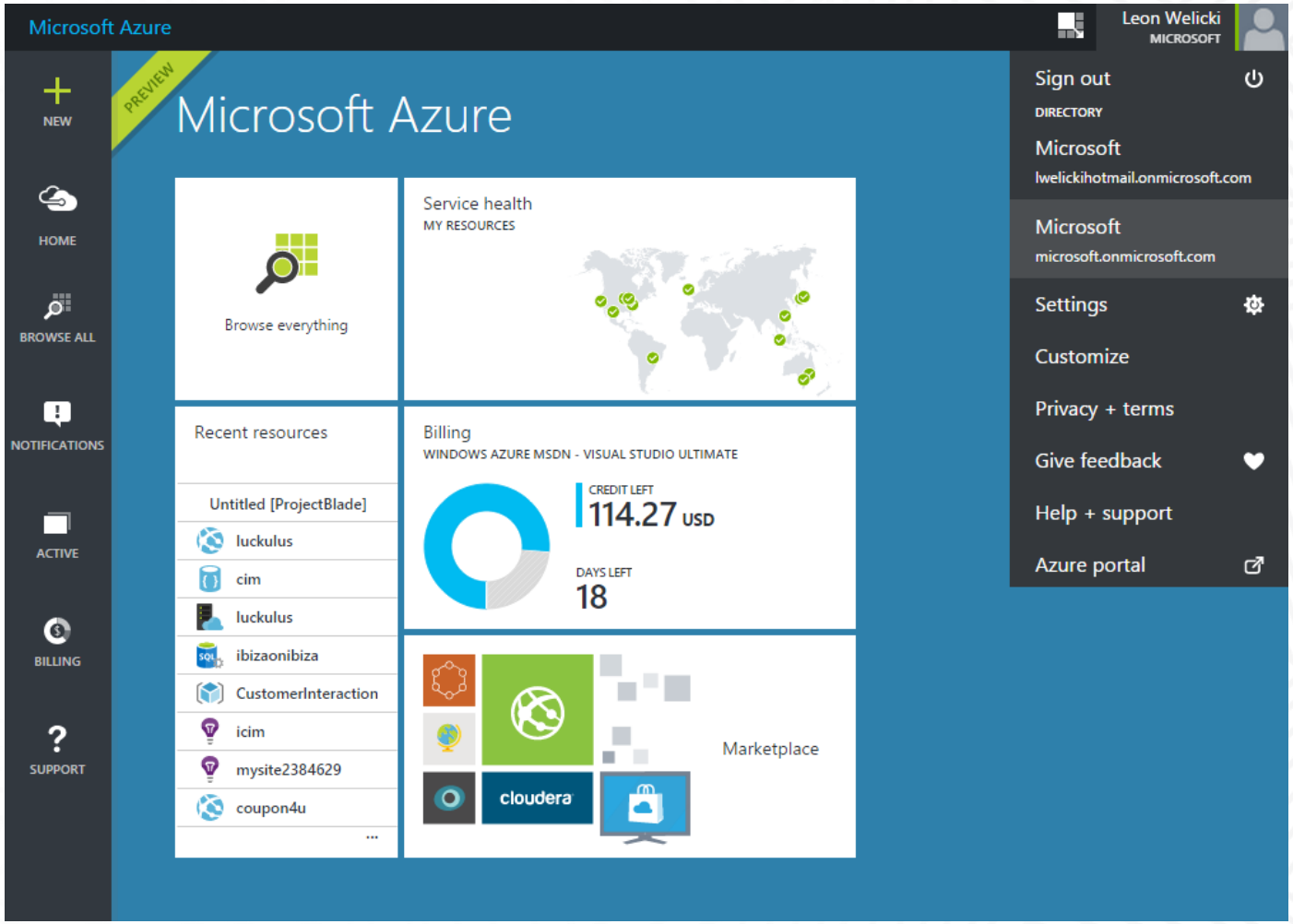


Microsoft Azure Stack – On Premise – Hybrid Cloud

- Azure consistent user experience
- Rich personalization
- Highly scalable
- Services marketplace
- Integration across services
- Extensible

Microsoft: "*Cloud is a Model not a Place*"

- Microsoft will uniquely have both a Public and Private Cloud offering
- **Azure** Datacenters are in 24 regions WW with 32 total announced
- **Azure Stack** is an extension of Azure



https://azure.microsoft.com/en-us/blog/azure-preview-portal-improvements-june-update/

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Lenovo ThinkAgile SX for Nutanix

Turnkey hyperconverged rack-scale for maximum agility, simplicity

25U or 42U Rack

Lenovo Switches with ThinkAgile Network Orchestrator

Lenovo XClarity

4-32 Lenovo ThinkAgile HX AHV, ESXi, Hyper-V + **Prism** management

E2E Lenovo Services/Support

Lenovo

NUTANIX

NUTANIX READY • AHV • INTEGRATED

Simplified IT deployment

Seamless experience

Increased IT agility

Industry frst

[1] Lenovo study of factory automation performed with ThinkAgile SXN vs HX for decreased onsite deployment time
[2] Nutanix CEO, IDC

Backed by industry-leading support

Delivering a white-glove experience

Post Deployment

- Single point of support from Lenovo
- Uniform, tailored support across the entire solutions (includes hw & sw)
- Best recipe firmware - kept up-to-date
- Validated SW & FW – best recipe

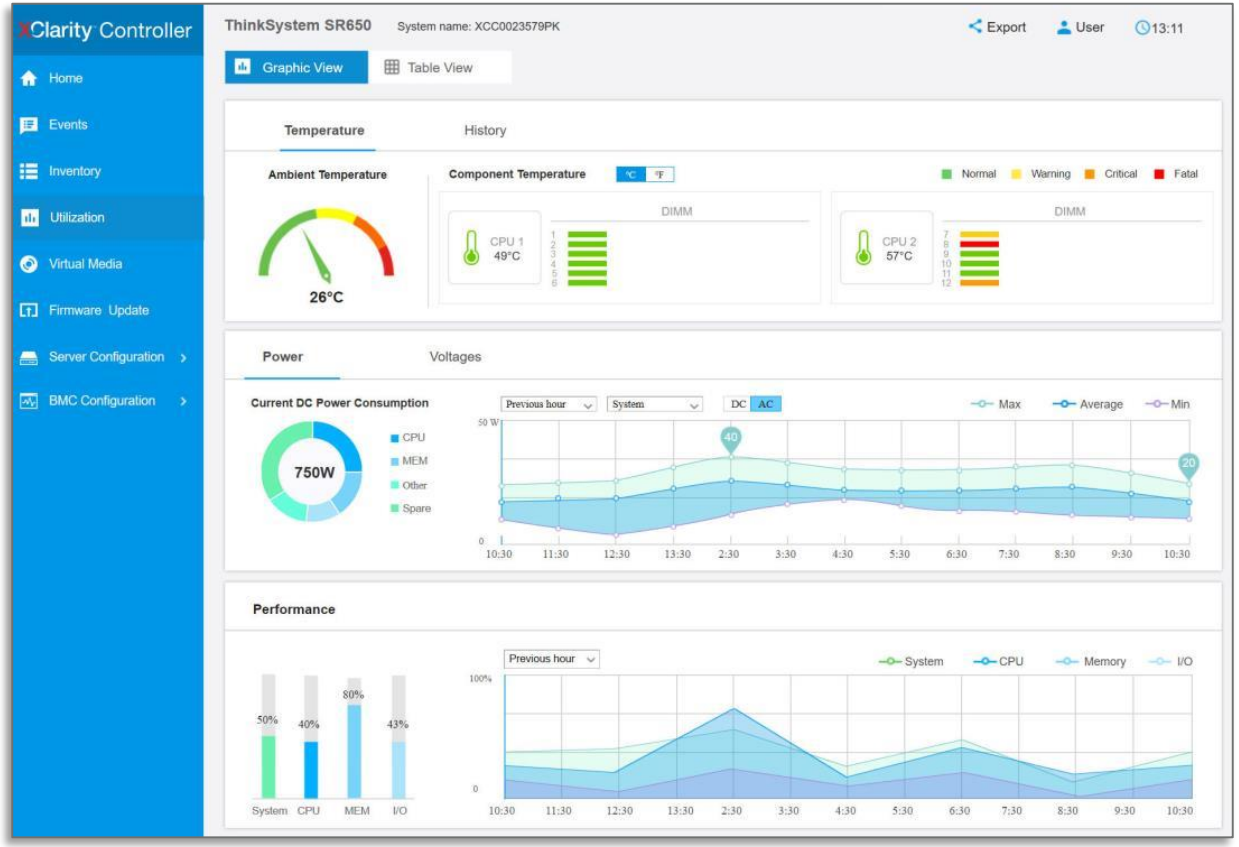
Onsite Deployment

- Best recipe firmware from factory
- Installation Services
- Deployment Services
- Knowledge transfer

Pre-deployment

- Sold, shipped and supported by Lenovo as a single unit, pre-configured, ready to deploy
- Pre-deployment worksheet

Simplify Infrastructure Management with XClarity



- All-new embedded management engine
- Common across all ThinkSystem server product lines
- Fresh and uncluttered HTML5 web-based graphical user interface
- HTML5-based remote presence eliminates Java and ActiveX plugins
- Redfish-compliant web-based REST APIs
- Stringent security
- Vastly improved system responsiveness

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Referanser og use cases

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Sørum Kommune

"We looked at software-defined storage offerings from several vendors, and Microsoft Storage Spaces Direct [S2D] on Lenovo servers was by far the most streamlined solution.."

"..the Lenovo servers deliver almost one million input/output operations per second (IOPS) – a huge boost in performance."

Anders Jensen Solution Architect, Sørum Kommune

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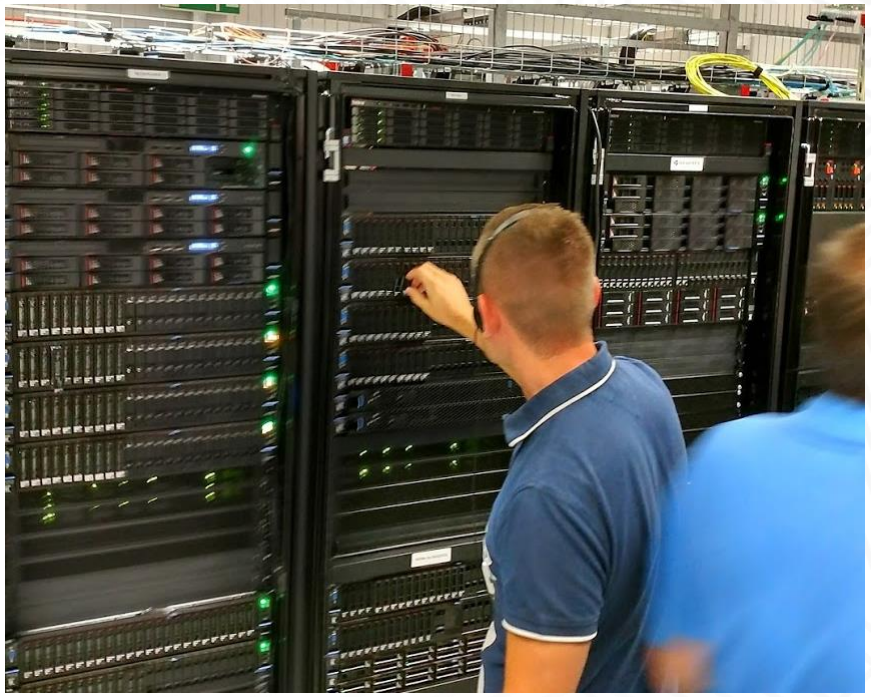
Microsoft Storage Spaces Direct hand-on traning

Goal: train to set up a Microsoft S2D cluster

22 Partners
3 full days
Hands-on with access to S2D clusters



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High-level summary

Sol ID	Solution type	Drive Bays	Boot Device	NVMe	SSD	HDD	NIC	RAM	CPU
B	High Performance All Flash	16x 2.5" + 4x NVMe 2.5" + 2x 2.5" Rear	2x SAS (300)	2x 2TB 2.5"	16x 1.6TB (S3610)	N/A	2x SP CX4 40Gb	768GB	E5-2650v4
C	Three tier dis-aggregated	12x 3.5" Front + 2x 2.5" Rear	2x SAS (300)	2x 2TB AIC	4x 1.6TB (S3610)	8x 6TB	2x SP CX4 40Gb	128GB	E5-2620v4
D	Two tier dis-aggregated	12x 3.5"	1x SSD (S3520 - 240GB)	3x 2TB AIC	N/A	9x 6TB	2x SP CX4 40Gb	128GB	E5-2620v4
E.1	Two node ROBO on x3550M5 (Alternative)	10x 2.5"	1x SSD (S3520 - 240GB)	2x 1.6TB AIC	N/A	8x 2TB	1x DP CX4 25Gb	384GB	E5-2620v4
G	2node Entry on x3650M5	12x 3.5" Front + 2x 2.5" Rear	2x SAS (300)	N/A	2x 800GB (S3710)	4x 4TB	2x SP CX4 40Gb	256GB	E5-2650v4

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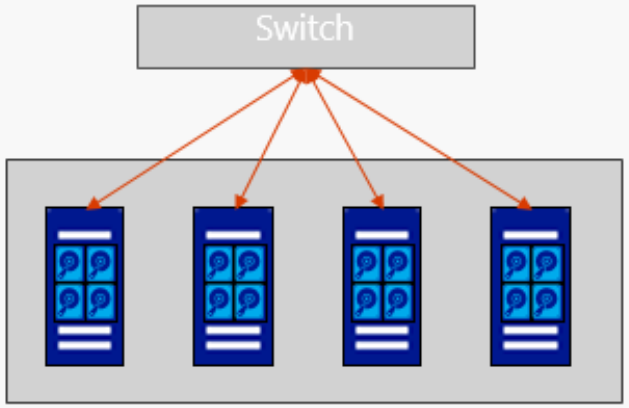
Networking Configurations

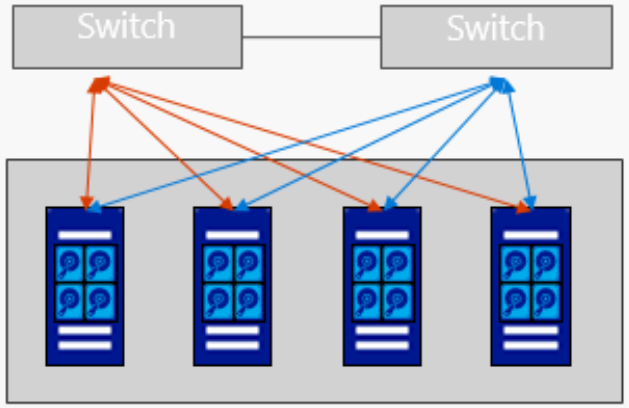
Entry level

Single Switch / Single Port



Datacenter

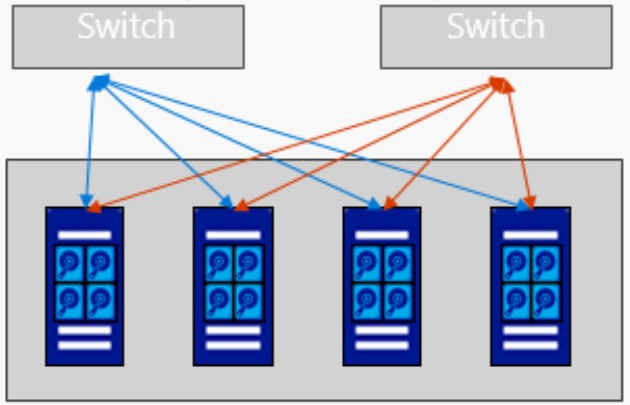
Multi-chassis Switch / Dual Port



Legacy Enterprise

Dual Switch /Dual Port

(Same L2 subnet)



	iWarp	RRoCE	SET	Host vNIC	Subnets	Resilience	
						Port	Switch
Single Switch / Single Port	Yes	Yes	No	1 mgmt + 1 storage + n VM	2+	No	No
Multi-chassis Switch / Dual Port	Yes	Yes	Yes	1 mgmt + 2 storage + n VM	3+	Yes	Yes
Dual Switch / Dual Port	Yes	Yes	Yes	1 mgmt + 2 storage + n VM	3+	Yes	Yes

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Components

Nano: Cluster added during OS Deploy

Full:

```
Add-WindowsFeature Failover-Clustering
Add-WindowsFeature RSAT-Clustering-Mgmt
Add-WindowsFeature RSAT-Clustering-PowerShell
```

Core:

```
Add-WindowsFeature Failover-Cluster
Add-WindowsFeature RSAT-Clustering-PowerShell
```

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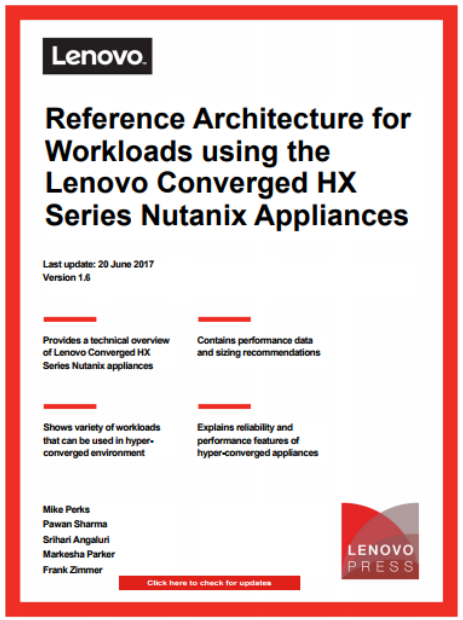
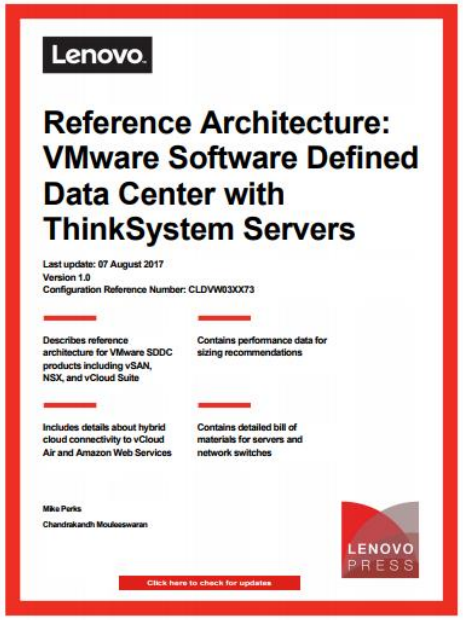
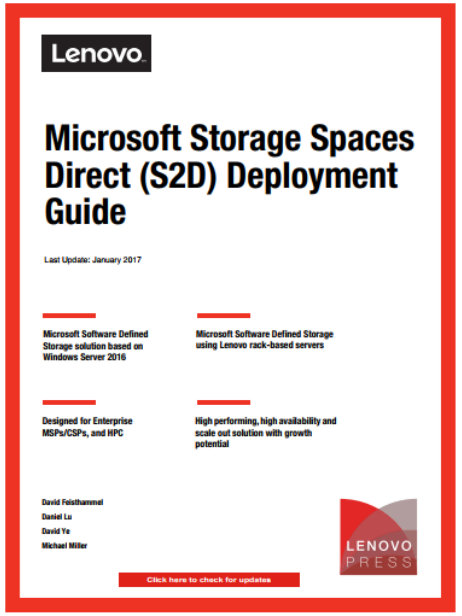
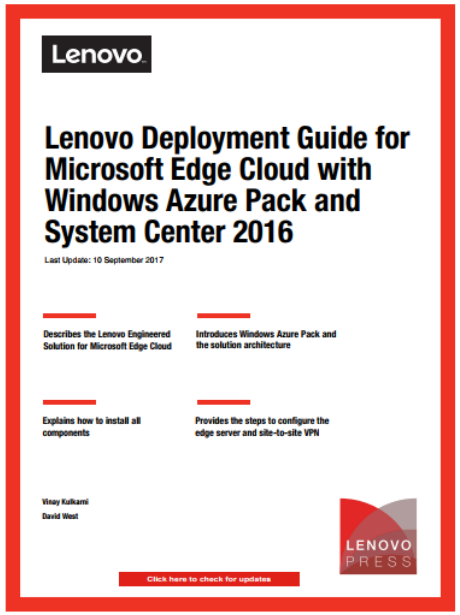
Different solutions for testing and demos

Lenovopress.com - Referansearkitekturer









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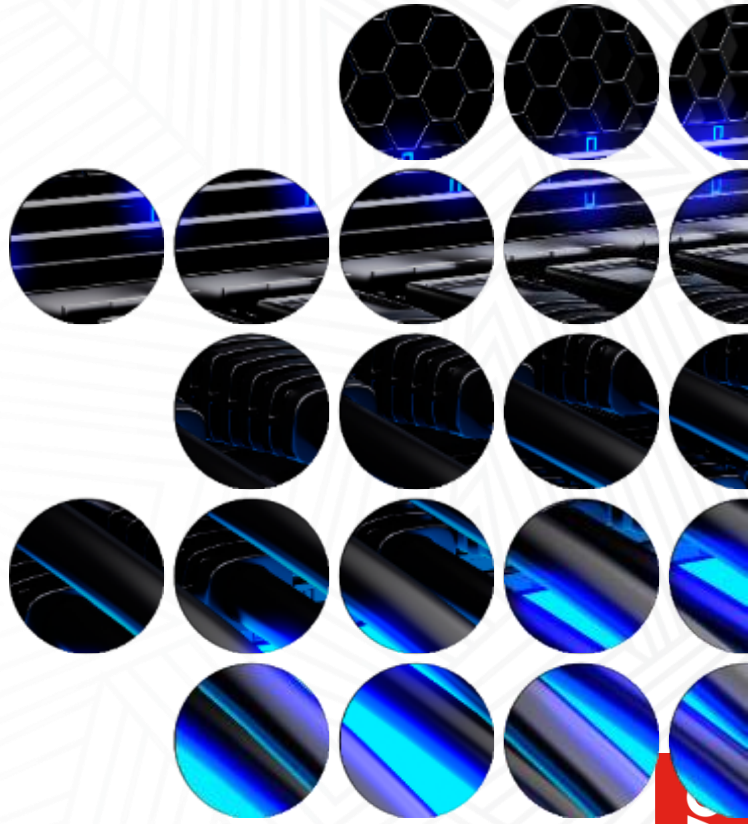
Lenovo—Powering the Future-Defined Data Center

ThinkSystem
flexibility / reliability / performance

ThinkAgile
simplicity / control / agility

Engineered Solutions
validated / optimized / tested

Services
comprehensive / customized / accessible



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