

# OPEN & FLEXIBLE IT INFRASTRUCTURE TO CHANGE THE ECONOMICS OF CLOUD

Miguel Terol Palencia  
IT & HPC Architect



Lenovo Data Center Group

# Open & Flexible IT Infrastructure to Change the Economics of Cloud

Lenovo Data Center Group

---

Miguel Terol

Data Center HPC IT Architect



# Agenda

- Lenovo Data Center
- Lenovo Cloud Point of View
- Lenovo & Redhat Solution





# ➞ Lenovo Data Center

Context and Lenovo Value

# + Lenovo Data Center Group

Lenovo is a \$45B global technology company with 55.000 employees

**160** countries

**12** development labs in 5 continents

**10.000+** IT support specialists

**3.000** field service locations

**2.000** Data Center Engineers

**9** Lenovo Factories across the globe

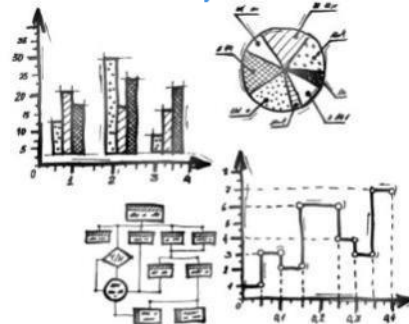
**~2.7 million** machines in warranty and maintenance



# + Revolution in the Data Center

FRAMEWORK PETABYTES  
DATABASE SMART CONTENT @  
VAST USEFUL DOWNLOAD  
**BIG DATA**  
ETADATA CONTENT  
STRUCTURED  
VOLUME  
MP

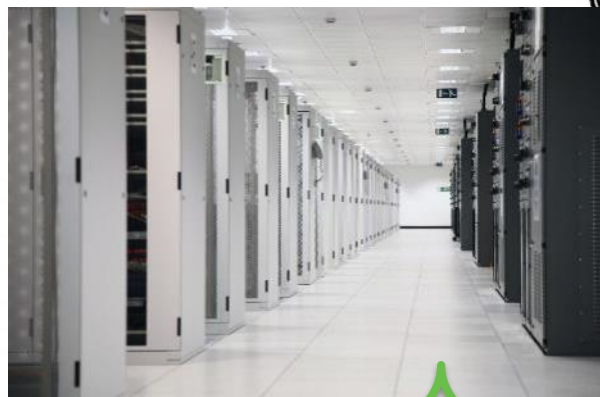
Analytics



Cloud computing



Lines of Business (LOB)



Servers Networking Storage

# + The IT transformation journey

Optimize total cost and reduce expenses to develop new investment opportunities

Develop more agile responses to changing demands

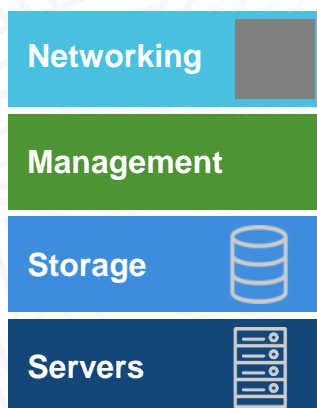
Increase workforce, hardware, and software efficiencies to reduce cost and complexity



# + New IT Transition is Driven by Ease of Deployment and Flexibility

## Traditional

Acquired as discrete parts  
Hard to deploy

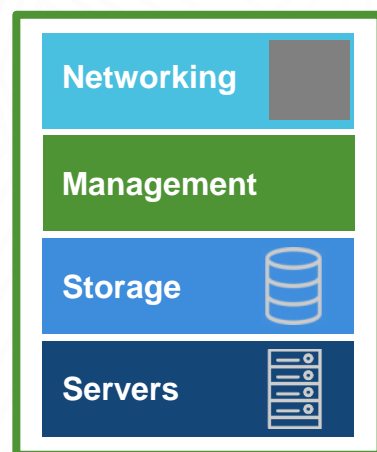


Virtualize Server

'16 TAM: \$69B  
'20 CAGR: 4.6%

## Convergence

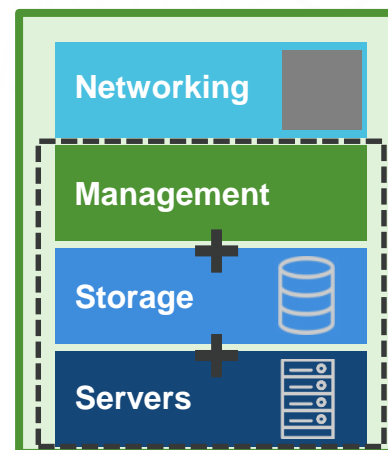
Acquired as single entity  
Faster deployment



'16 TAM: \$10B  
'20 CAGR: 5.2%

## Hyper Converged

IT Agility - moves storage  
as part of server

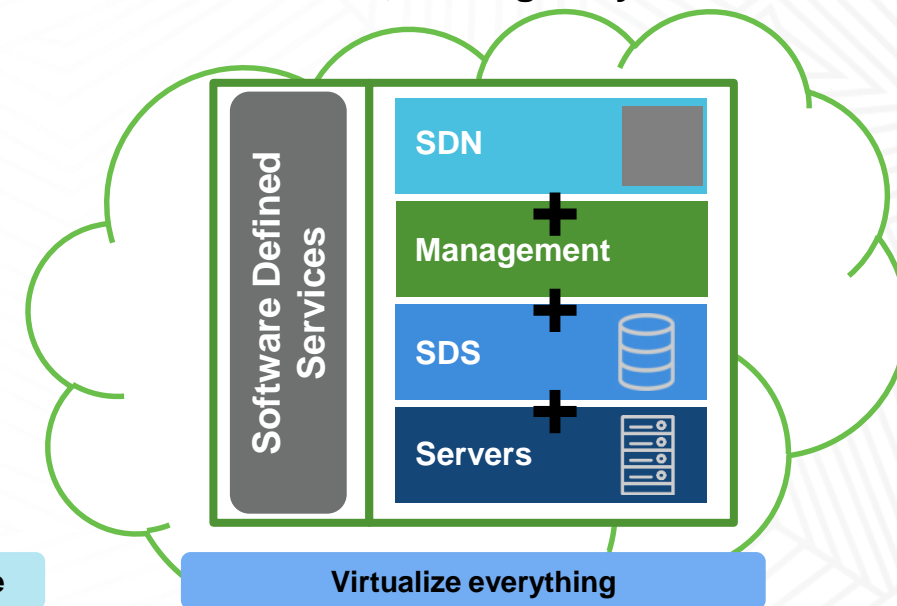


Virtualize Server and Storage

'16 TAM: \$2B  
'20 CAGR: 31%

## SDDC

IT Agility - virtualizes server, storage,  
network, moving to hybrid



'16 TAM: \$6B\*  
'20 CAGR: 26%

\*Includes Tier 1 hyperscale, Hyperconverged \$2B TAM

Value

Composability\*

Rapid time-to-deployment

Hybrid IT resource pool management

Continuous and dynamic integration

Opportunity in nascent stages, current market penetration <1%  
By 2018, 20% of Converged will include elements of Composable Infrastructure

EBG TAM = Server, Storage all PB, L2/3 DC Switching  
IDC Forecasts; Factory Revenue; MI Modelling



# Lenovo innovates in foundation technologies

**Purpose-driven innovation** optimizing key requirements

## Ultimate Performance

Achieve faster business results

## Reliability and Security

Improve uptime

## Management and Efficiency

Reduced operational expense



## PERFORMANCE

26 current world record benchmarks



## CUSTOMER EXPERIENCE

#1 in Reliability in x86 Server

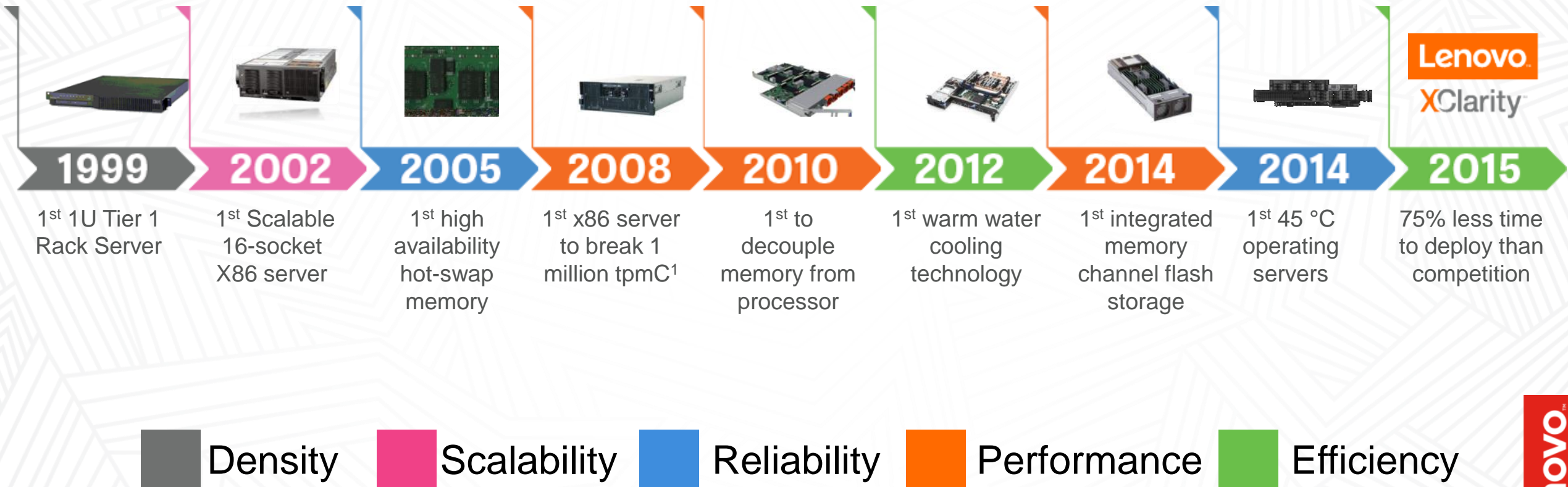


## CUSTOMER EXPERIENCE

#1 in x86 Servers customer satisfaction

# + History of Innovation

Lenovo ahead of the curve in helping to address key customer needs



**Lenovo**  
XClarity™

# + Lenovo portfolio spans the entire Data Center

World class portfolio for end-to-end data center requirements

## Server

Highest reliability  
in the industry

XClarity

Rack & Tower  
System x, ThinkServer



Mission Critical  
X6



Dense  
NeXtScale, ThinkServer



Blades  
Flex System



Hyperconverged  
HX Series



## Storage

Unbeatable Price perf. &  
latest innovations

Entry SAN  
S Series



Mid-range SAN  
V Series



SDS  
DX8000C, DX8000N



All Flash Array (AFA)  
Coming soon



Direct Attach & Archive  
E Series, TS



## Networking

Best performance  
lower cost

Embedded



Top of Rack



Campus and Core



Storage Switches



Network OS



## HPC

The Racing Arm of  
Lenovo IT

Compute  
NeXtScale nx360



Storage  
nx360 + Storage NeX



PCI  
nx360 + PCI NeX



GPU & Storage  
nx360 + Storage & GPU



Water Cooled  
nx360 WCT



## Hyperscale

Customer-Centric,  
Strategic Partner-Based  
Approach

Compute & Warm Storage



Application Optimized



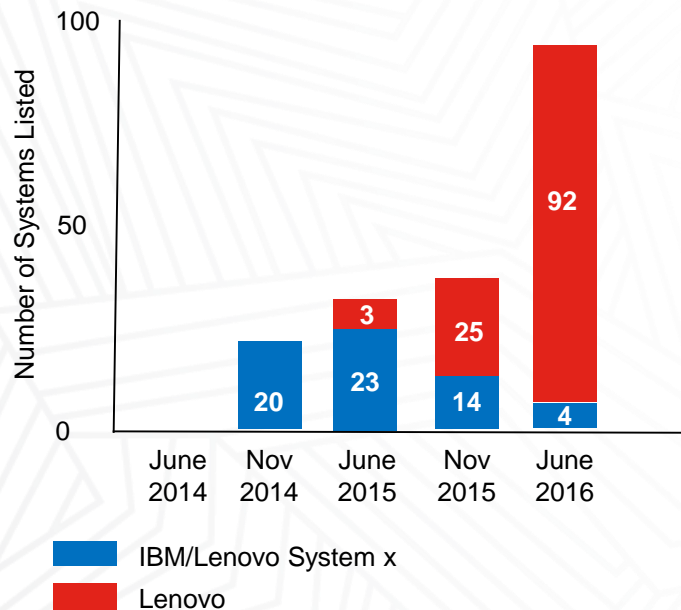
Rack Scale Architecture



Note: Lenovo XClarity features vary  
across portfolio.

End to end services that span from basic to consultative engagements

# + Top500 – Lenovo Perspective

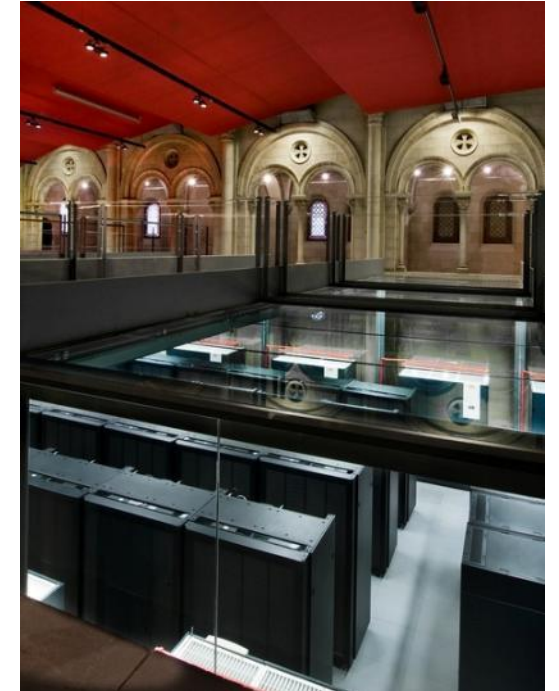


- June 2016 achieved 2nd overall spot for number of systems listed
- 92 total entries on Top500 that are solely Lenovo named
- Broad range of Lenovo systems listed – NeXtScale, System x, ThinkServer, 2S, 4S, 8S
- Fastest Intel OmniPath (CINECA) interconnected system on Top500

“We are pleased to announce our partnership with Lenovo and Intel to deliver a high performance and productive computing facility confirming Cineca as a major actor for HPC initiatives in Europe.”

-- **Sanzio Bassini, HPC Department Director at Cineca**

# + Barcelona Supercomputing Center



# + Lenovo helps transform

## **Flexible IT on demand**

---

Cloud (Private and Hybrid)

## **Reduced operational expense**

---

Converged and Hyperconverged  
Systems

## **Significant advantage in large scale computing solutions**

---

High Performance & Hyperscale systems

## **Automation and efficiency**

---

Software defined data center



# + Lenovo delivers choice and flexibility



Lenovo has a unique approach to strategic partnerships, where there is no competition in the partner space, rather innovation and IP development to strengthen the joint offerings – delivering flexibility to customers.

# + World Class Portfolio build on a Strong Foundation

#1

CUSTOMER  
SATISFACTION

In the latest TBR survey (1H 2016), Lenovo again was the #1 vendor for the 6th consecutive quarter, and for 9 of the last 10 quarters.

#1

x86 SERVER  
RELIABILITY

#1 in ITIC Reliability Survey for 3 years running.

#1

MICROSOFT SQL  
2016  
PERFORMANCE

x3950 X6 TPC-H @ 30,000 GB non-clustered<sup>1</sup>, x3850 X6 TPC-H @ 10,000 GB non-clustered<sup>2</sup>, x3650 M5 TPC-E3 and x3850 X6 TPC-E4

#1

SAP HANA  
Server  
Installations

Lenovo is SAP's largest partner with over 50% of SAP installs on Lenovo hardware.

28

Current World  
Record x86  
Benchmarks<sup>1</sup>

Lenovo enables faster data analysis.

#2

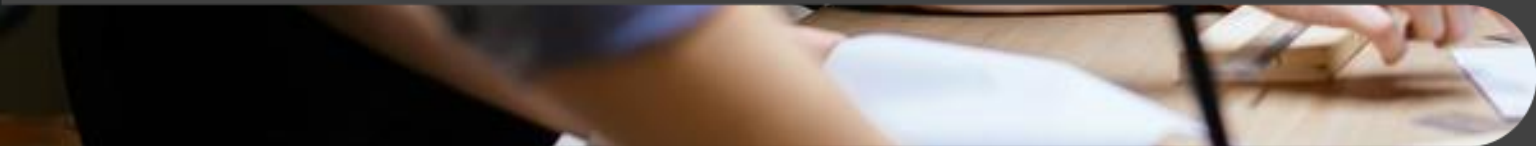
TOP500 HPC  
Vendor<sup>2</sup>

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



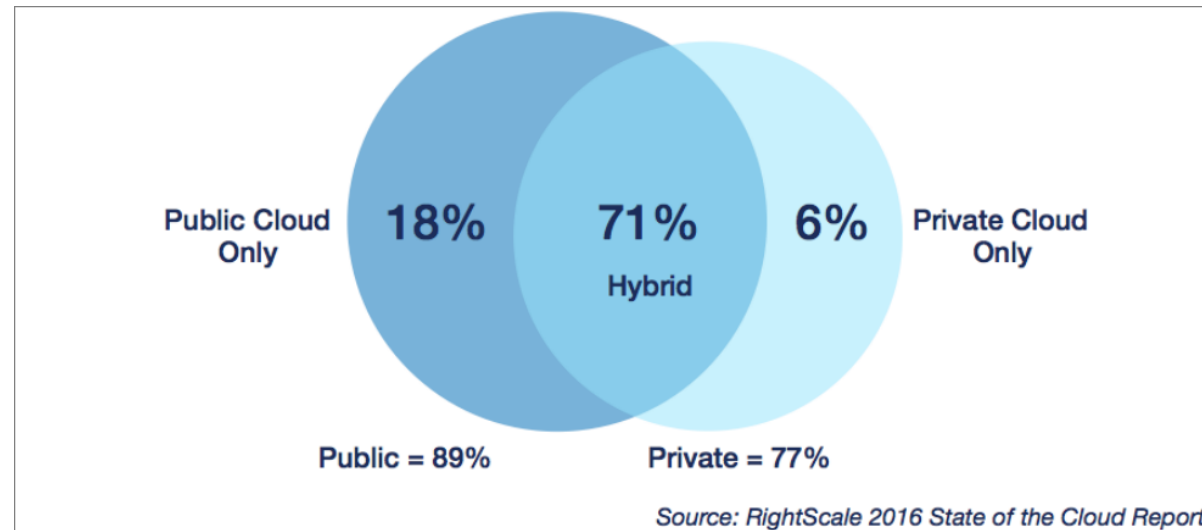
# ➞ Lenovo Cloud Point of View

Lenovo®



# + Most enterprises are adopting a hybrid cloud strategy

71% of enterprises adopt hybrid cloud



## Public Cloud

Less control over quality of service, security concerns and cost can become a significant issue for some workloads and larger enterprises.

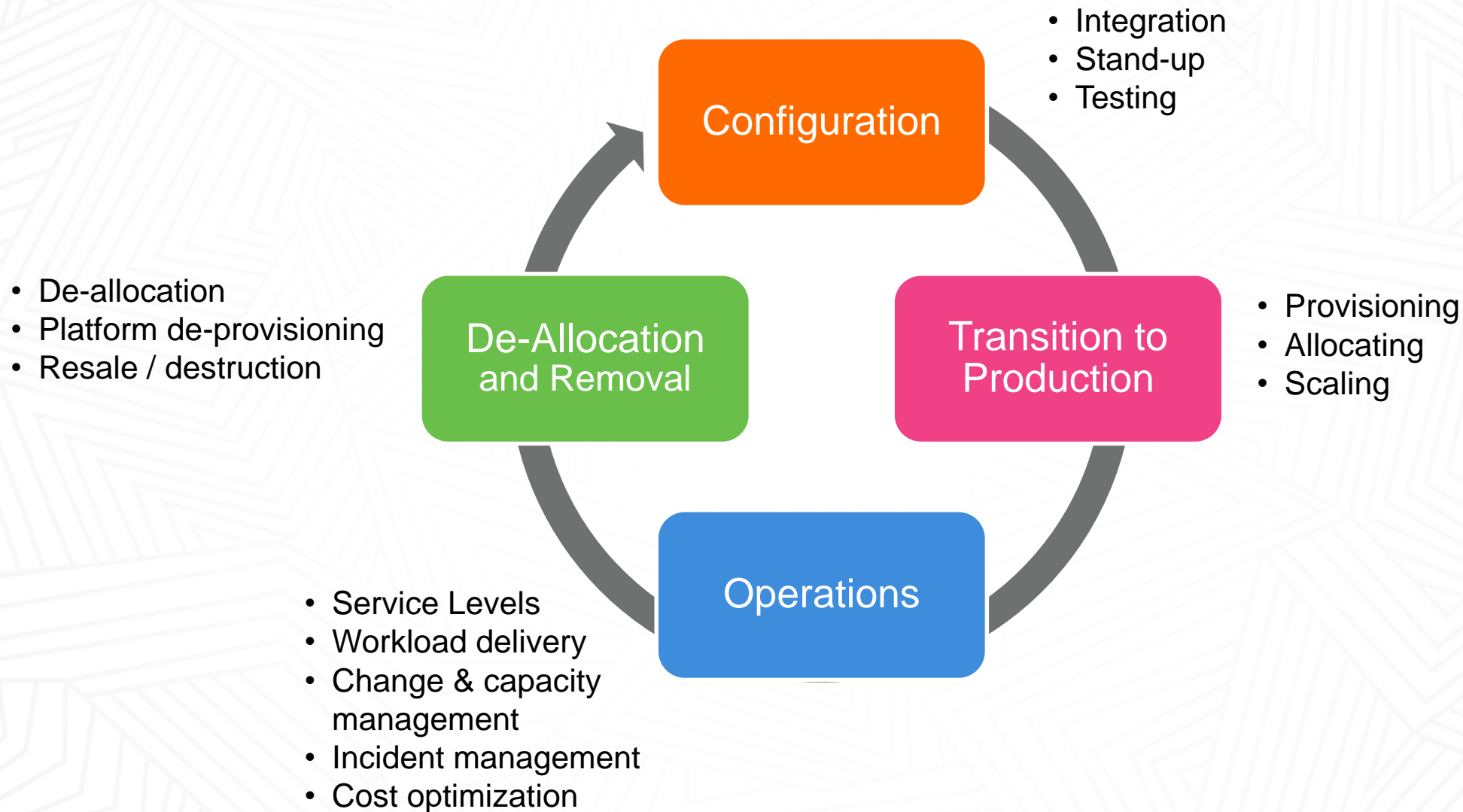
## Hybrid Cloud

The best of what private and public cloud offer with ultimate flexibility and scale. Lenovo offerings include Azure\*, Openstack, VMware reference architectures

## Private Cloud

Best control of workloads in a secure datacenter. Lenovo offerings include Azure\*, Openstack, Red Hat and VMware reference architectures

# + Challenges of Delivering Hybrid Cloud



# + Public Cloud Costs are Not Always Better

- Private cloud

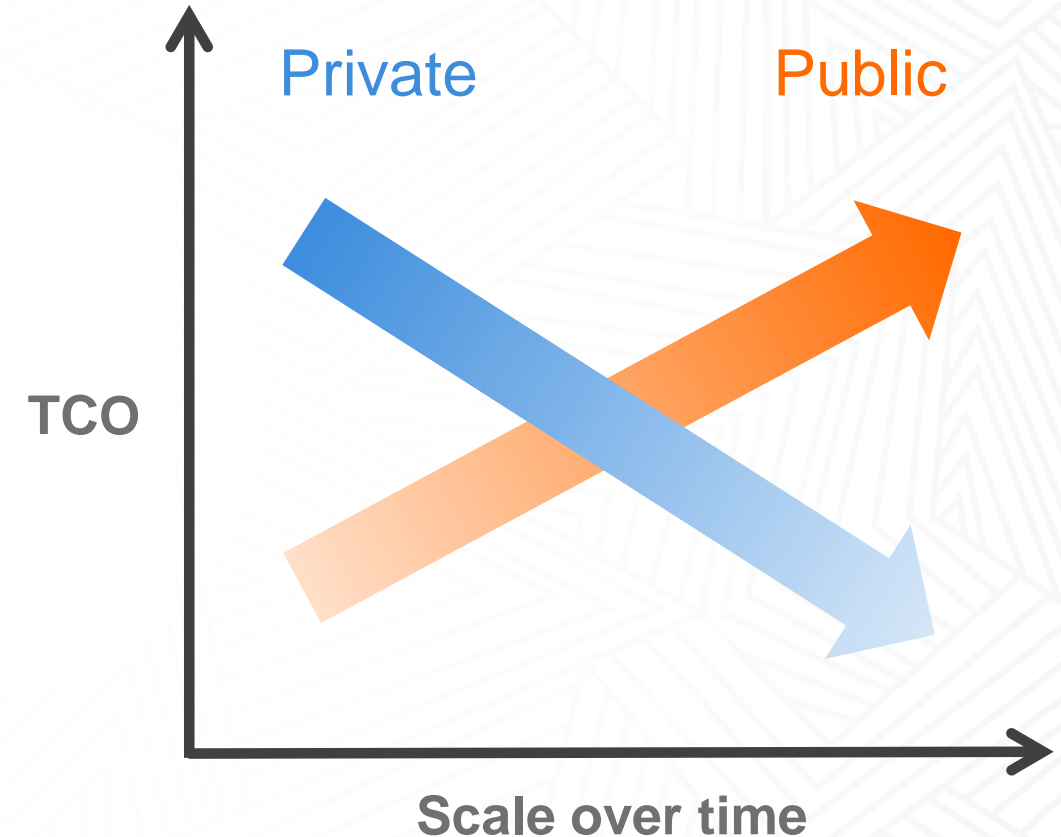
- Higher initial acquisition cost
- Economies of scale through density

- Public cloud

- Lower initial acquisition costs
- OPEX grows rapidly

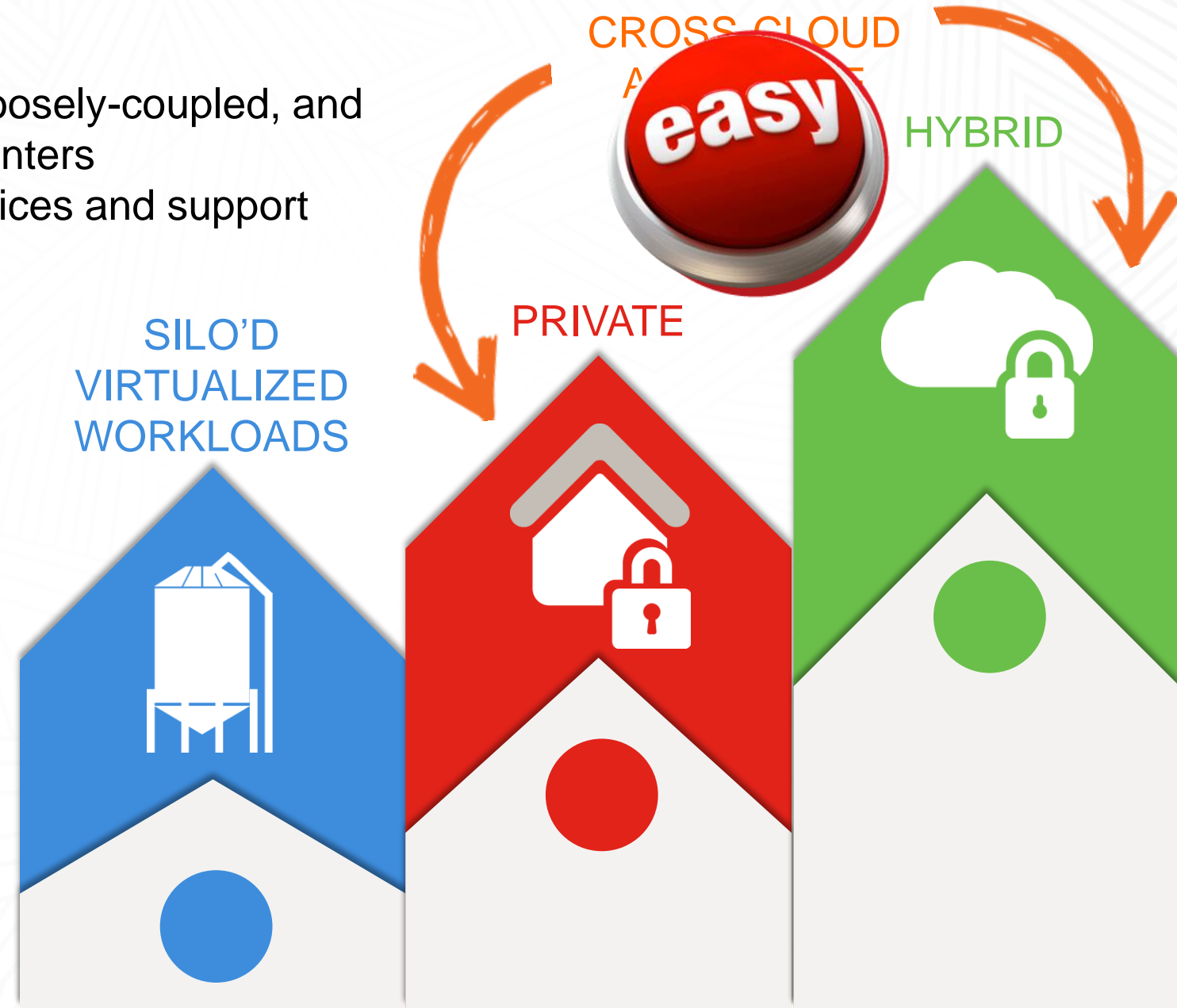
- Results

- 71% of enterprises adopt hybrid cloud<sup>1</sup>
- 68% have repatriated from public cloud to some form of private cloud<sup>2</sup>



# + Lenovo Vision for Cloud

- Simplify the journey
- Enable software-defined, loosely-coupled, and composable hybrid data centers
- Deliver transformative services and support



# + Lenovo Open Source Leadership and Collaboration

## Community Participation

- OpenStack Foundation Corporate Sponsor
- Developing and contributing platform drivers and code across OpenStack projects

## Engineering and Development

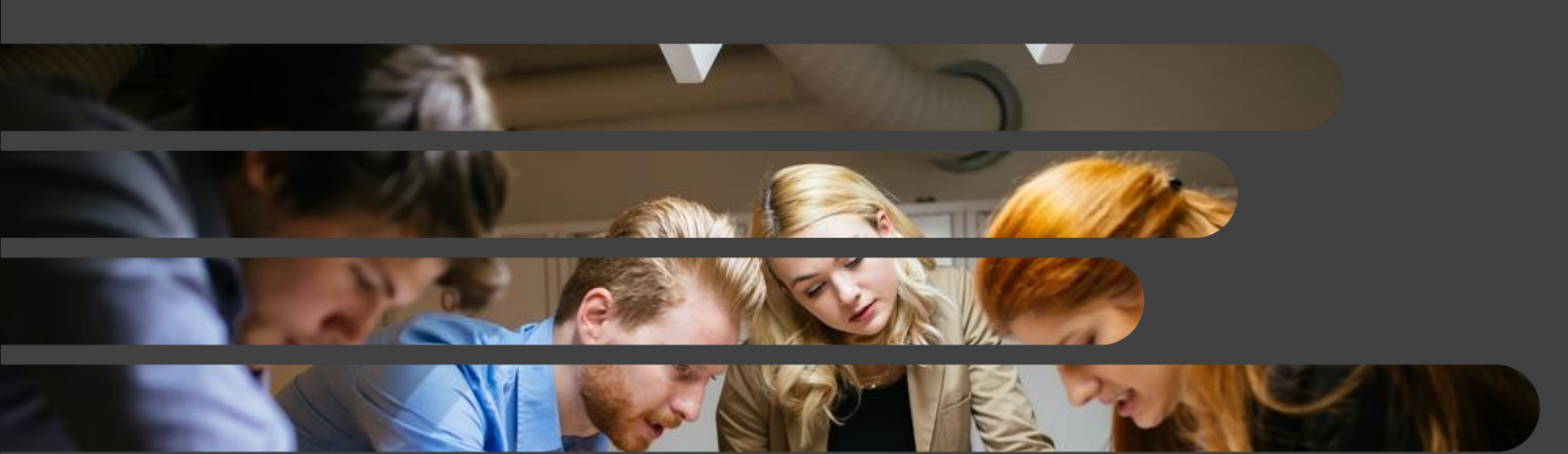
- Bare metal provisioning with Ironi and XClarity<sup>1</sup>
- Sample XClarity scripts for Ansible, Chef, and Puppet scripting tools<sup>1</sup>
- Open vSwitch (OVS) / Virtual Extensible LAN (VXLAN) and Lenovo Networking
- Ceph software-defined storage and Lenovo servers
- Hybrid data center management

## Solutions Roadmap

- Co-engineering with OpenStack contributing partners to accelerate innovation



Enterprise Linux OpenStack  
Platform



# ➞ Lenovo & Redhat Engineered Solution

Lenovo®

# + Lenovo Engineered Solutions



## Feature

Designed & architected including unique IP

Best practices end-to-end documentation

Service & Support for lifecycle

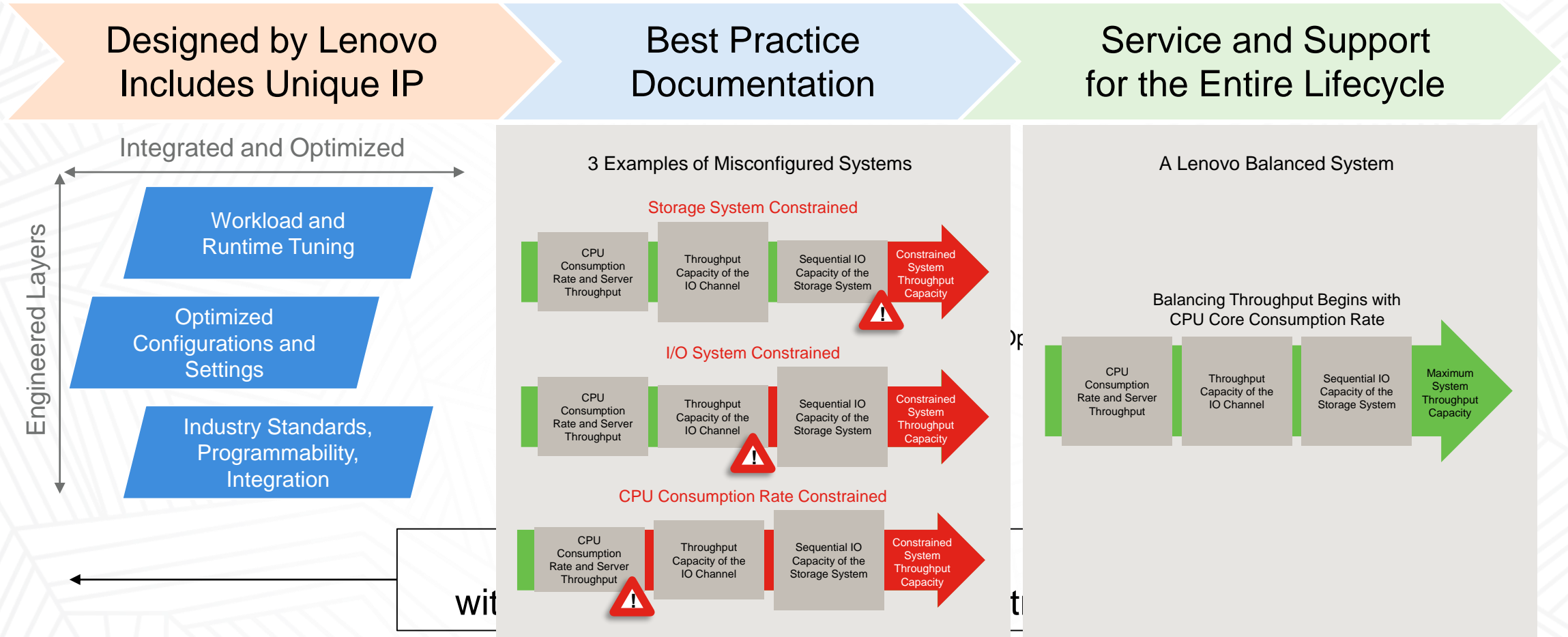
## Benefit

TCO / ROI

“Easy Button”

Reduce OPEX

# + Lenovo Engineered Solution Defined



# + Lenovo-Redhat Strategic Partnership



## WHAT is it?

Lenovo and Red Hat have expanded an existing strategic partnership beyond Linux and KVM virtualization to private/hybrid cloud infrastructure. The goal of our expanded partnership is to enable customers to dramatically change the economics of building their cloud with simplified solutions comprised of open standards-based hardware and software backed by validated reference architectures and professional services.



## IDEAL use cases

### Enterprise Private/Hybrid Use Cases

- Build, test, and deploy new applications faster with a private Infrastructure-as-a-Service (IaaS) cloud for internal application developers or DevOps teams
- Provide a new private or hybrid cloud environment to support cloud-native workloads, with centralized operational management across cloud and existing non-cloud IT infrastructure

### Service Provider Cloud Use Cases

- Build and operate a cost-effective, standards-based cloud to offer public IaaS services to external customers



## WHY customers will care

- Lenovo and Red Hat uniquely offer open, standards-based cloud solutions based on leading price-to-performance hardware and subscription-based software, with the flexibility to integrate into existing environments. This means customers can easily build and deploy new high performing, resilient and agile cloud environments at significant cost advantage compared to expensive, proprietary cloud solutions.

# + Changing The Economics of Cloud Computing



Speed service delivery  
and increase resiliency



Avoid vendor lock-in  
and dependencies



Reduce IT capital expenditures and  
operating expenses



Accelerate deployment of new  
applications



Rely on end-to-end, open, resilient, and  
secure platform



Choose capabilities as needed for your  
environment and use cases

# + Lenovo Engineered Solution for Red Hat OpenStack

Deliver a Public Cloud Experience  
From Behind the Corporate Firewall



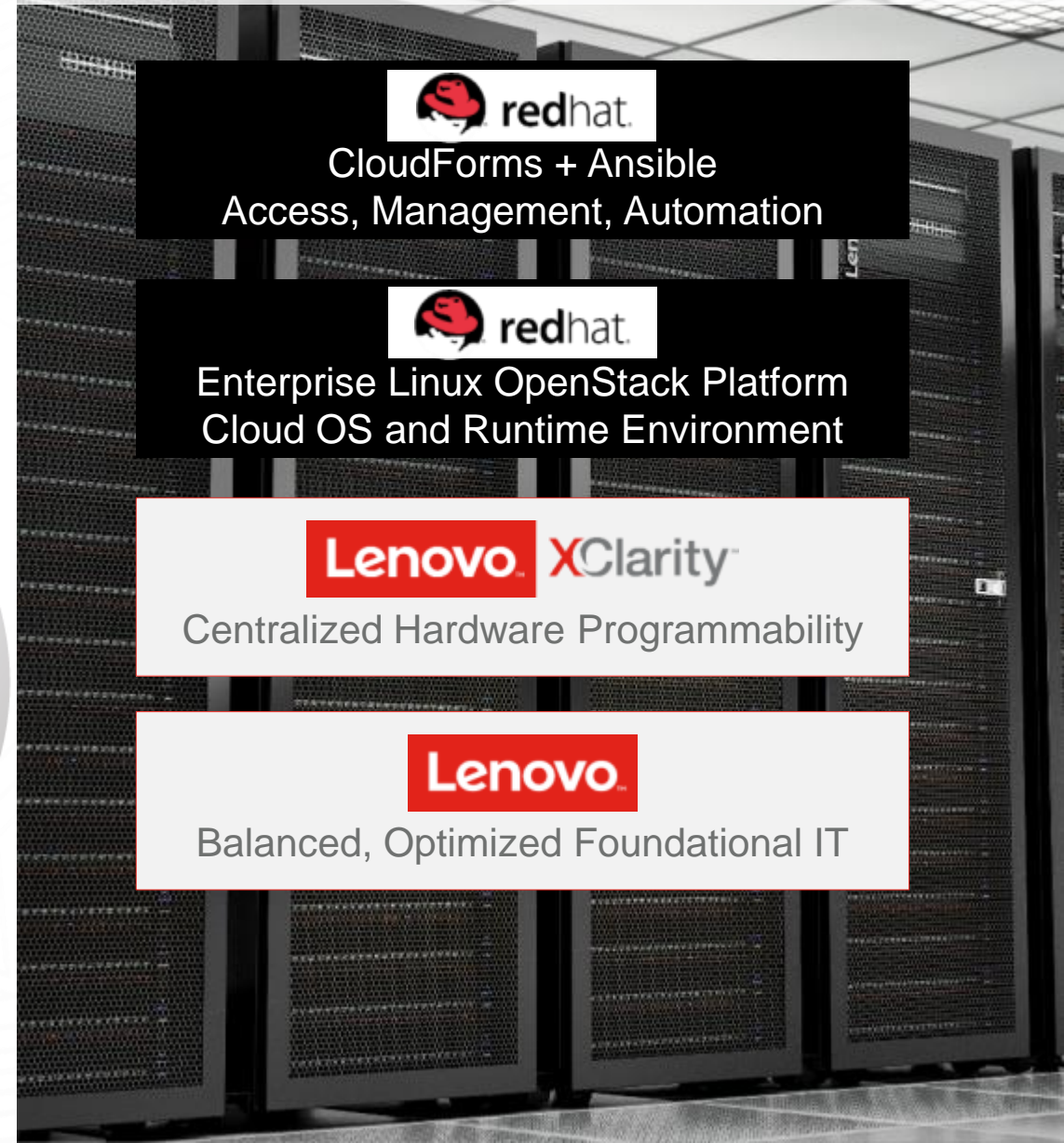
**6 Steps**

Rapidly deploy an  
OpenStack  
cloud<sup>1,2</sup>

**Phase 1  
Shipping  
Today**

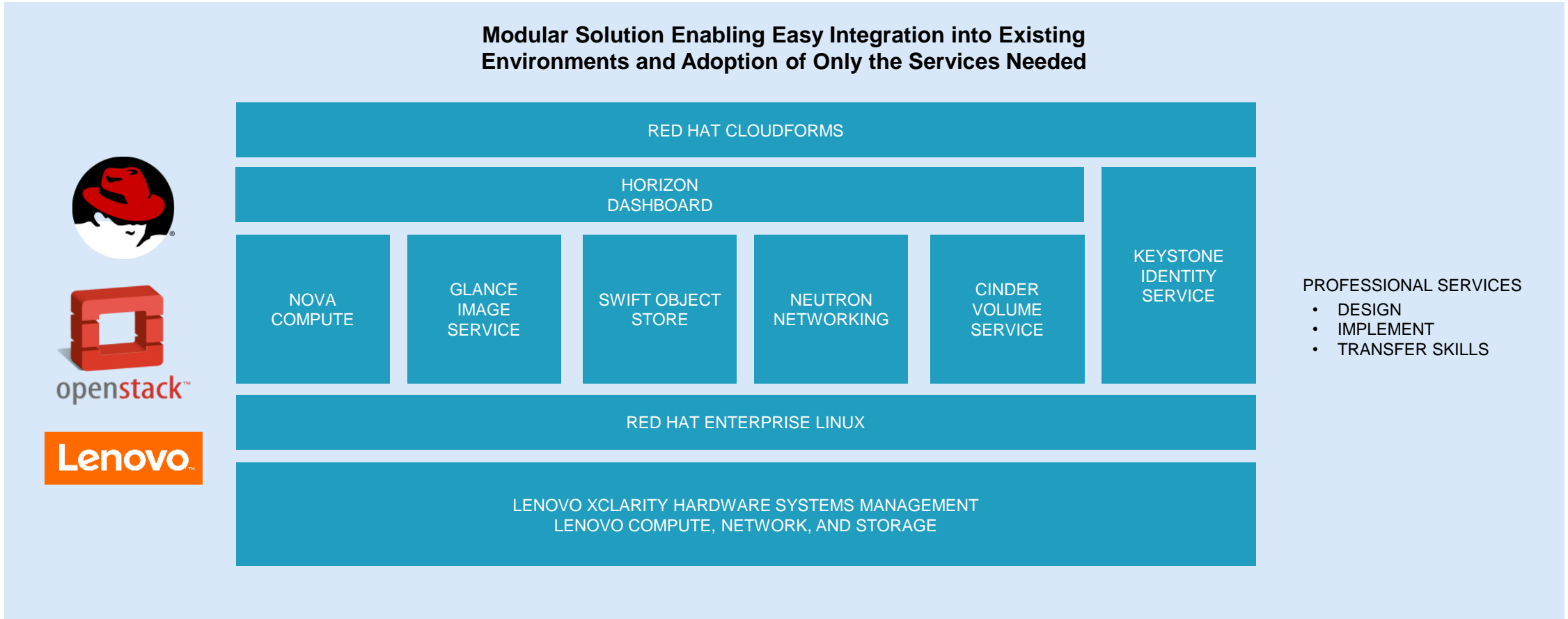
1. [https://www.lenovo.com/images/products/system-x/pdfs/white-papers/rhel\\_osp\\_deployment\\_guide\\_wp.pdf](https://www.lenovo.com/images/products/system-x/pdfs/white-papers/rhel_osp_deployment_guide_wp.pdf)

2. [https://www.youtube.com/watch?v=\\_Om2gznGOo](https://www.youtube.com/watch?v=_Om2gznGOo)



# + Lenovo and Red Hat Cloud Solution That Works For You

## Integrated, Validated, and Customizable Cloud Reference Architecture



# + Lenovo and Red Hat Cloud Solution That Works For You



Open Standards-Based Hardware Systems

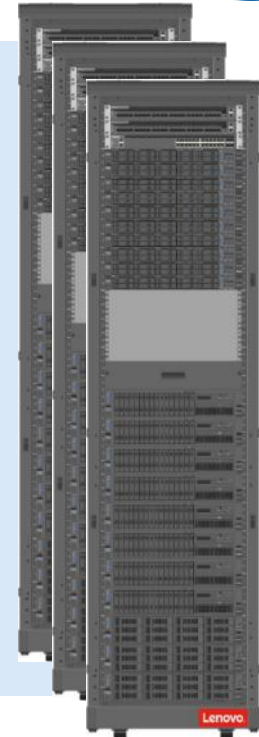


**G8272 1GbE Switch** Management network  
**G8272 10GbE Switch**

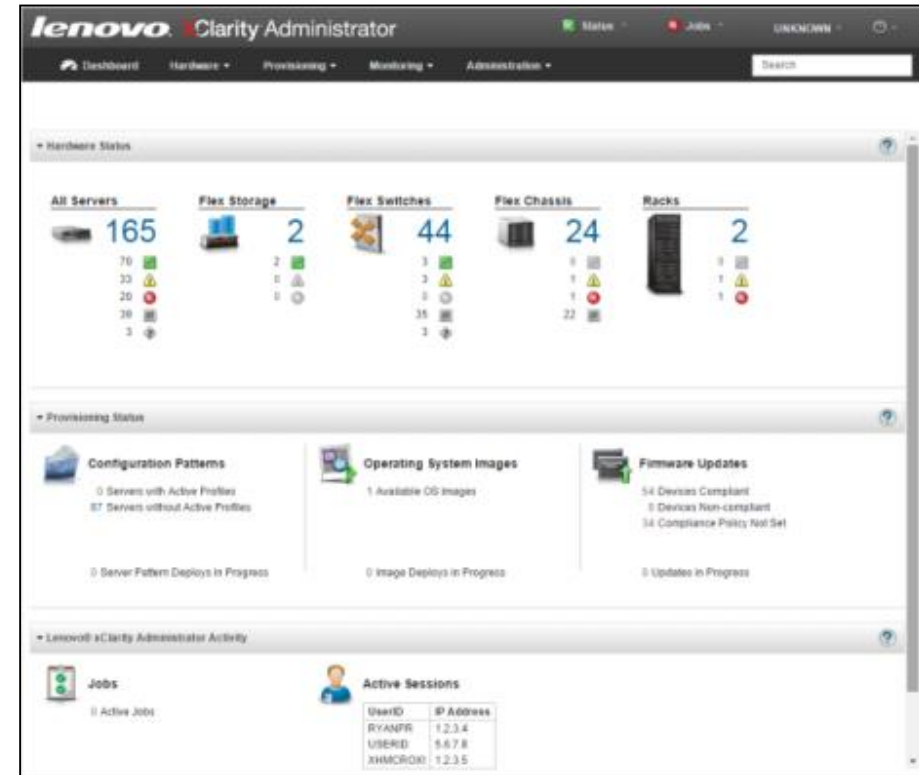
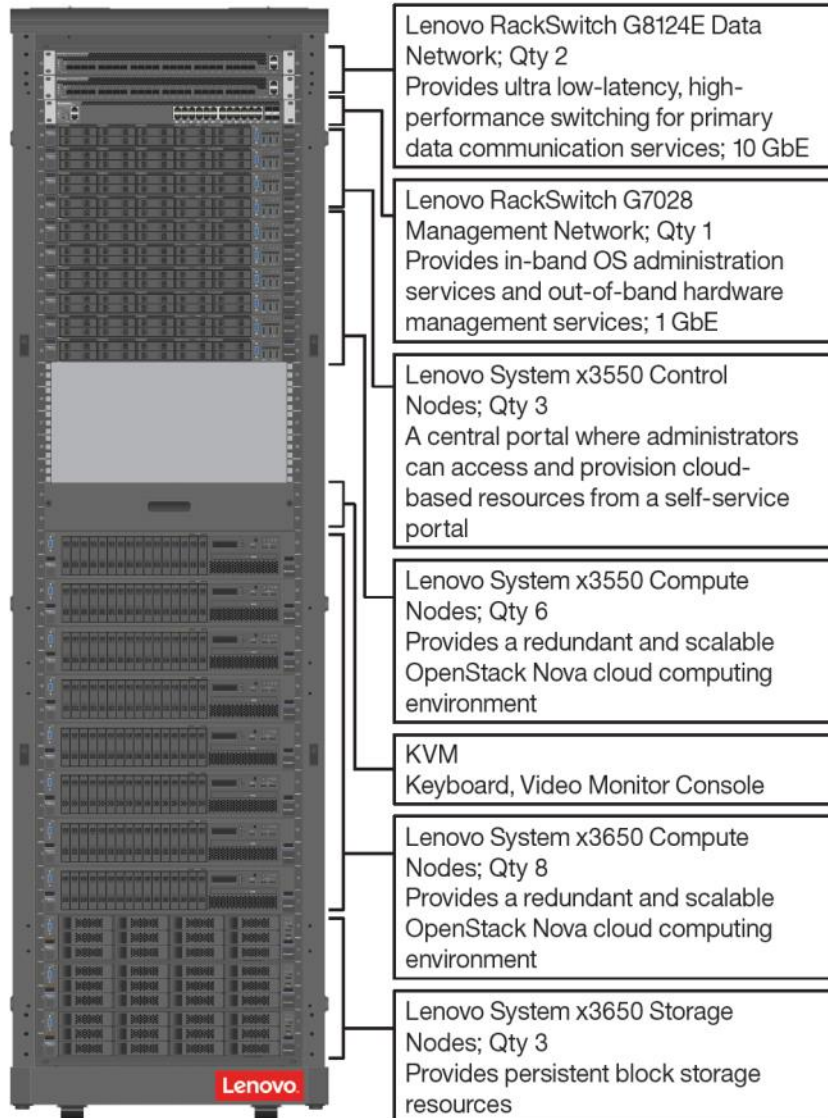
**System x3550 or ThinkServer RD550** RHEL OSP director  
**System x3550 or ThinkServer RD550** Controller node

**System x3650 or ThinkServer RD550** Compute nodes  
**System x3650 or ThinkServer RD650** Storage nodes

**Start Small and Scale Easily to Meet  
New Demands**

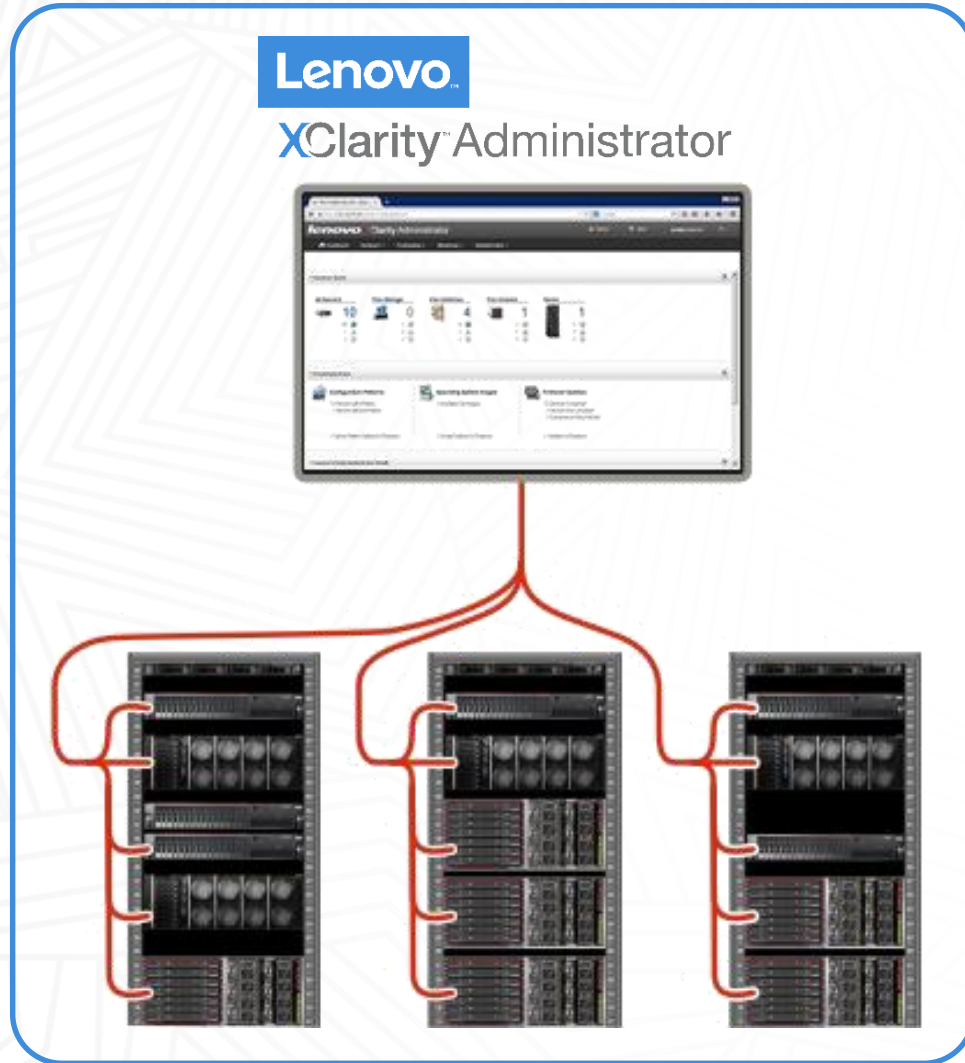


# + Available Lenovo Products in this Reference Architecture



Sample configuration of Lenovo Cloud Reference Architecture  
for Red Hat Enterprise Linux OpenStack Platform

# + Simplify, Unify & Accelerate Systems Management

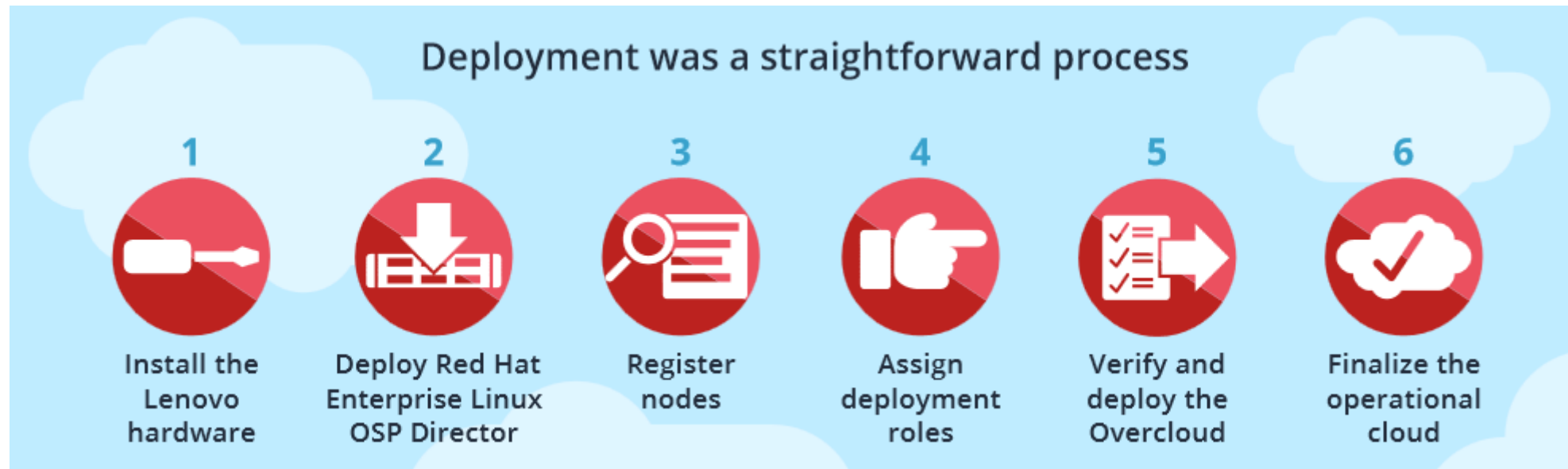


- Centralize deployment and management of physical systems
  - Pattern-based deployment
  - Policy-based firmware management
  - Centrally monitor & handle faults
- Easily integrates into existing IT application environments
  - Centralized point of integration using REST APIs
  - Integrator software plug-ins

***XClarity integration into CloudForms***

# + Deploy OpenStack in 6 Steps to Accelerate Time to Value

## Lenovo and Red Hat Enterprise Linux OpenStack Platform



[https://www.lenovo.com/images/products/system-x/pdfs/white-papers/rhel\\_osp\\_deployment\\_guide\\_wp.pdf](https://www.lenovo.com/images/products/system-x/pdfs/white-papers/rhel_osp_deployment_guide_wp.pdf)

# + Benefits of the Lenovo and Red Hat Cloud Solution



- Leading price-to-performance software and hardware infrastructure
- Fully integrated, validated, and modular reference architecture
- Simplified infrastructure deployment and operational management
- Easily integrated into existing environments and management processes
- Lenovo Professional Services to speed design and implementation



- Open standards-based software
- Start small, easily scale as needed
- Deploy only the cloud system services that are needed
- Customizable virtualized resource pools optimize compute and storage ratios



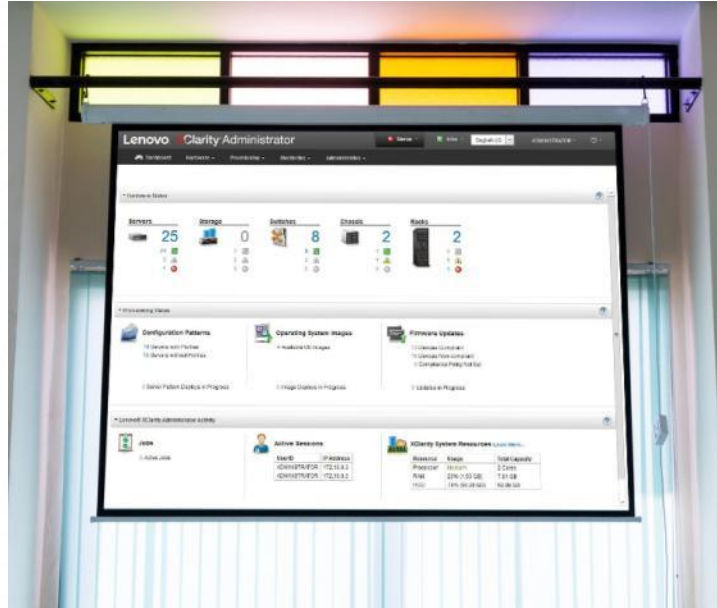
- Open standards-based hardware and systems management
- #1 server customer satisfaction
- #1 x86 server resiliency
- Automated, rapid hardware system provisioning with XClarity
- Professional Services to help modernize the data center

# + Engage with Lenovo



## Share

Discuss customer needs, share evolving industry trends, review Lenovo's strategy and family of data center offerings



## Experience

Review and explore demonstrations of Lenovo's data center solutions that can transform your data center



## Prove

Collaborate with data center solution experts to validate industry leading solutions built on Lenovo server, storage and networking products

# + Engage the Lenovo Innovation Center

Remote demo, POT, and POC services

## Remote engagements with VPN access

- Interactive demonstrations
- Specific proof of technologies
- Broad proof of concepts

## Benefits

- Access to subject matter experts
- Generate key information for decision-makers
- No on-site disruptions
- Faster turnaround times
- Less expensive than on-site setup

**Business Applications**

**Database, Big Data, & Analytics**

**Cloud & Orchestration**

**Software-Defined Storage**

**Virtualized Desktop & Software-Defined Network**

**Operating Systems & Hypervisors**

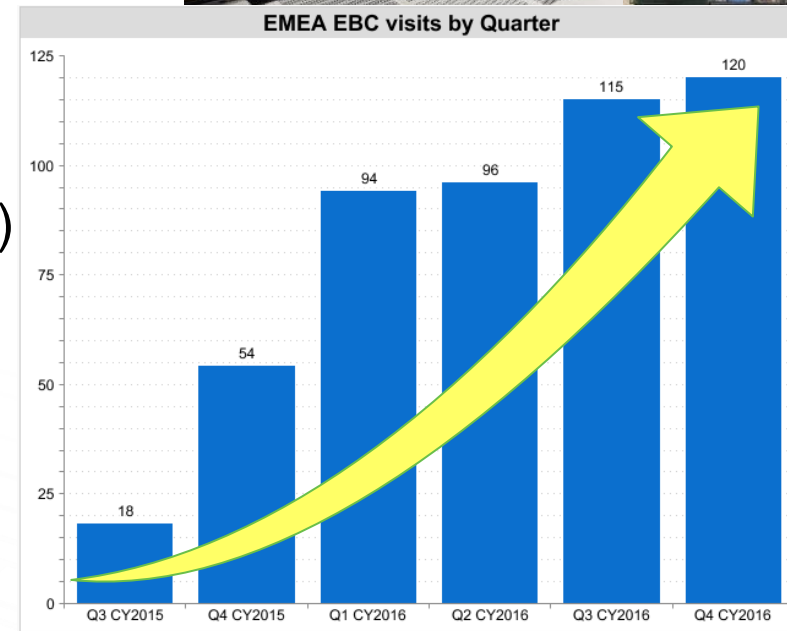
**Systems Management**

**Converged & Hyperconverged Systems**

**Servers, Networking, Storage**

# + EMEA Executive Briefing & Innovation Center

- Rise your win chance by using the EBC
  - Drive more engagements (customers & partners)
  - Leverage open capacity in EBC
  - Use EMEA Study Tour program
- Prepare for new products/new brand
  - NDA Briefings with or without Intel
  - IC tour to see the products (DAU systems)
- Prove it with the Innovation Center
  - Remote access to all HW & all solutions in our DCG portfolio
  - Hybrid-cloud with MS Azure stack



New EBC Video  
[here](#)

“The EBC is amazing.  
I have been through a number of EBC’s and this was by far  
the best. Eye opening. Awesome information.” - *SHI*

“Due to the positive PoC we were able to get a  
new SAP HANA project by a competitive  
account.” - *Lenovo Solution Sales*



thanks.



GRACIAS