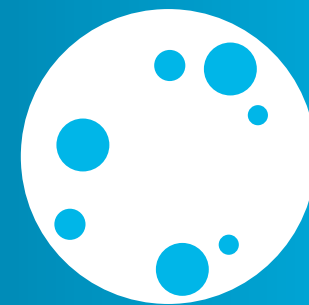




How to get the most from hyperconvergence

A brief guide to hyperconverged infrastructure (HCI) and what the next evolution in computing infrastructure can do for your business



Contents

Chapter 1

The next generation in IT infrastructure

- What is hyperconvergence
- Infrastructure evolution
- HCI market heats up

Chapter 2

The business need

- Storage challenge
- Drive for efficiency
- Agility and adaptability
- Move at the speed of business

Chapter 3

Introducing Cisco HyperFlex

- What makes HyperFlex different?
- HX Data Management Platform
- Lab-certified market leading performance
- One system for all workloads

Chapter 4

HCI use cases

- Databases and mission critical applications
- Virtual Desktop Infrastructure (VDI)
- Server virtualisation (VSI)
- Test and development
- Remote office / branch office (ROBO)

Chapter 5

Get ready for lift off

- References



Chapter 1

The next generation in IT infrastructure

Not all HCI solutions are created equal

Hyperconvergence is a hot topic right now. And for good reason.

Organisations have longed for a way to reduce the amount of time and effort it takes to deploy new business-facing IT services.

Hyperconverged infrastructure (HCI) delivers the speed, simplicity and agility needed in today's digital economy.

But not all HCI solutions are created equal. And HCI is not the answer for every application or workload.

In the following, we explore what makes HCI different from traditional IT infrastructure and how your business can benefit from the new capabilities it brings.



“...a software-based architecture that integrates storage, compute, virtualisation, and networking resources in a box.”

Grand View Research

What is hyperconvergence?

The all-in-one data centre

Hyperconverged infrastructure (HCI) is the next step in the evolution of IT infrastructure.

It takes the idea of integrating compute, storage and networking that started with converged systems and adds deeper levels of abstraction and automation to provide an all-in-one data centre that can be up and running in **under an hour**.

According to Grand View Research, the key benefits of HCI are:

- Eliminates the need for making individual purchases of servers, virtualisation software and management tools
- Supported by a single vendor
- Does not require installation of Storage-area Network (SAN) or Network-attached Storage (NAS)
- Integration reduces the overall cost of the HCI system

They eliminate the need for making individual purchases of servers and virtualisation software running on those servers and management tools, and do not require the installation of Storage-area Network (SAN) or Network-attached Storage (NAS)

Grand View Research

Infrastructure evolution

Pure appliance model

The advent of virtualisation enabled pools of compute and storage resources to optimise the underlying infrastructure. Apps no longer needed to map to physical servers or storage devices.

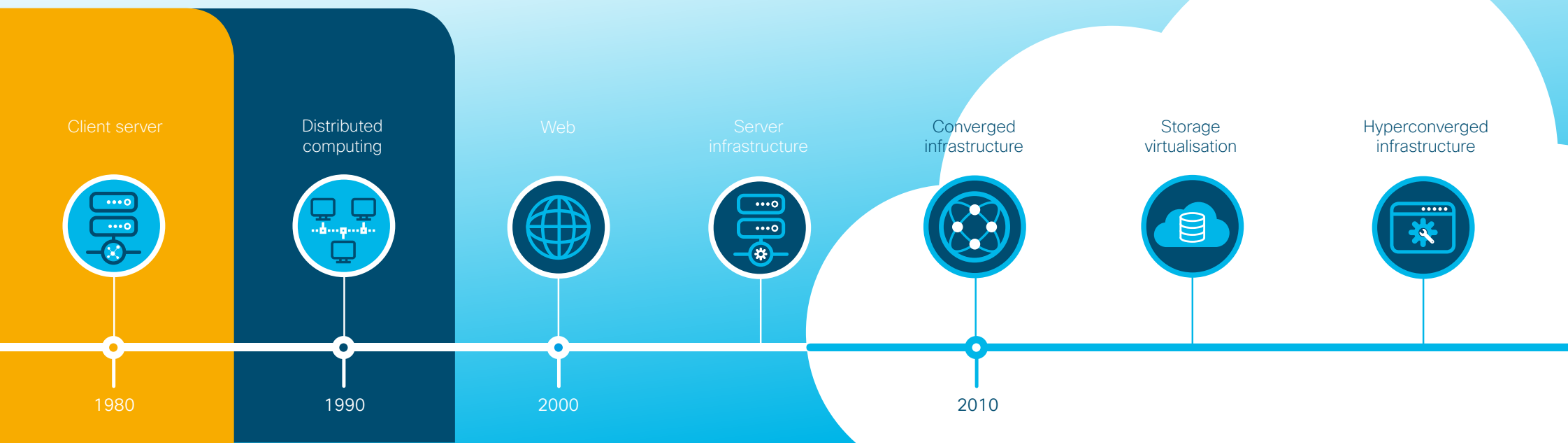
As virtualisation became mainstream, many companies deployed freestanding a-la-carte infrastructure with compute tied to external storage arrays.

Converged infrastructure took the same a-la-carte components and delivered them as a pretested solution or appliance to increase operational effectiveness. This also increases reliability and reduces time to value for IT investments.

HCI solutions reorganise the components of converged infrastructure and are combined with software to deliver a pure appliance model. This architecture further simplifies operations.

However, the typical enterprise now has a data centre built in silos of hardware to support a range of distinct applications. This distributed environment can be static and inflexible. It also means IT staff devote a large amount of time and resources to deploy, provision and manage the individual components.

Evolution of converged and hyperconverged infrastructure



HCI market heats up

Built for simplicity and speed

HCI offers the simplicity and speed of an appliance approach by consolidating all required functionality into a single infrastructure running on an efficient pool of x86 resources.

It is generating a lot of industry excitement. Gartner believes HCI will become mainstream by the end of the decade in what it describes as a 'third wave of integrated systems in the data centre'.

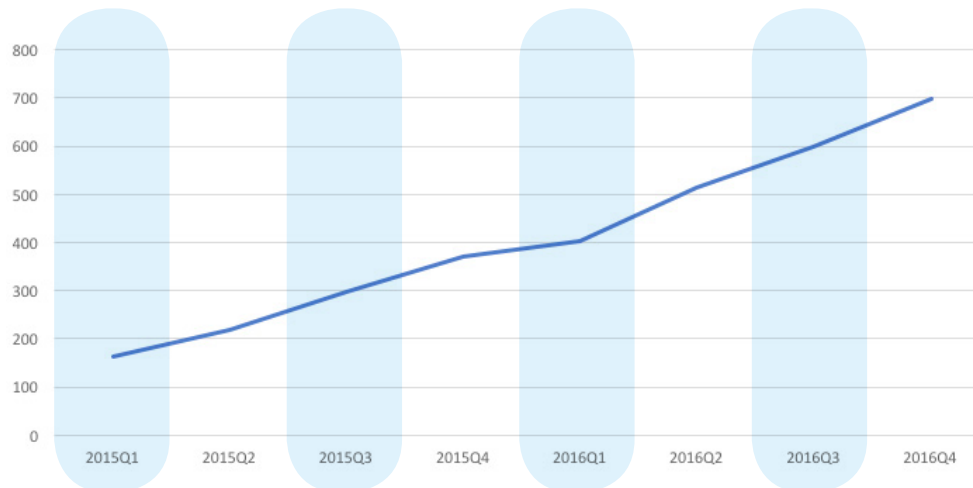
Currently, the enterprise IT market is stuck in a 'second phase', says Gartner. One marked by the maturity of converged infrastructure and the advent of HCI for specific use cases.

Nevertheless, the HCI market is growing fast.

IDC reports that HCI sales grew 87% year over year during the fourth quarter of 2016, generating \$697.4 million. This represents almost 23% of the total market value for converged systems worldwide.

According to IDC, HCI surpassed \$2.2 billion in global revenue during the full calendar year (2016) – 110% higher than 2015.

Total HCI vendor revenue (US\$M)



According to IDC, HCI surpassed \$2.2 billion in global revenue during the full calendar year (2016)

Chapter 2

The business need

Market drivers

Data growth and increasing complexity have made the management of storage an acute pain point for businesses.

At the same time, the world of hybrid IT and multicloud management, virtualisation and software defined everything is evolving at pace against a backdrop of demand for operational efficiency and speed of provisioning.

“As HCI ventures even deeper into the enterprise and cloud environments, the architectures will need to become more efficient, agile and adaptable to help IT professionals shoulder the burden of rapidly growing data sets and workloads.”

451 Research



Storage challenge

Legitimate alternative

HCI's ability to deliver key storage functions such as snapshots/cloning, replication and flash acceleration without the need for storage SAN expertise has proved a real game changer.

Initial deployments have been largely focused on the midmarket, where IT organisations often lack storage expertise and are not bound to a specific storage supplier.

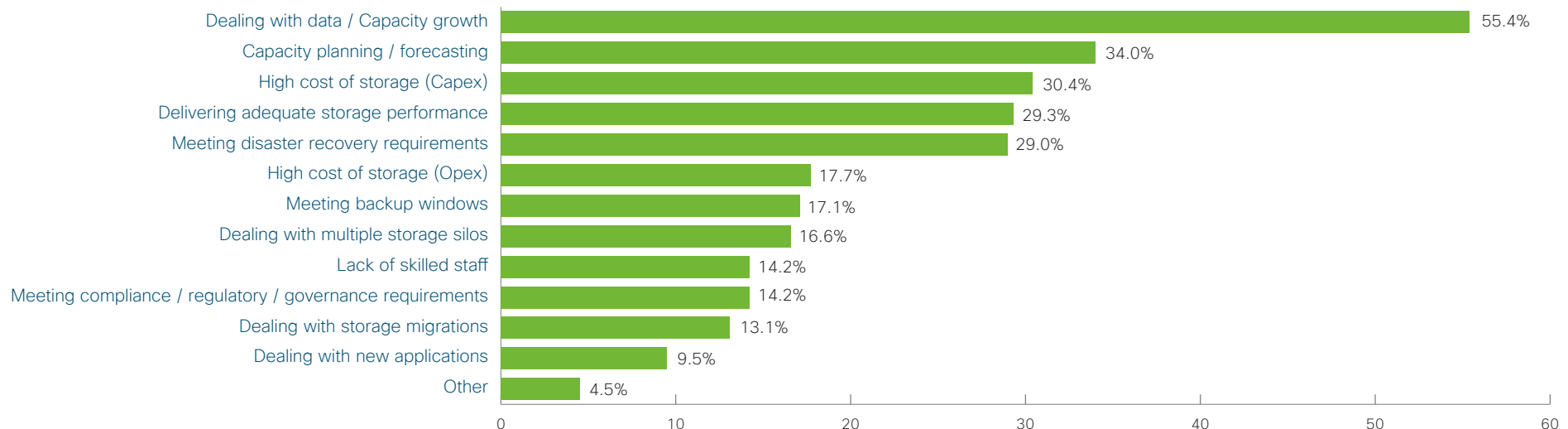
But as HCI ventures even deeper into the enterprise and cloud environments, the architectures will need to become more efficient, agile and adaptable to help IT professionals shoulder the burden of rapidly growing data sets and workloads.

So says 451 Research, who reports that HCI has become a legitimate alternative to traditional storage systems and shown that storage does not have to be confined to proprietary external arrays.

Its study found that storage and other infrastructure teams are being asked to do more with fewer resources, as budgets are not keeping pace with the 'alarming' growth in data volumes. Businesses will therefore need to embrace storage-reduction technologies such as deduplication and compression to boost the efficiency of their storage systems.

Top storage pain points

What are your organisation's top three pain points from a storage perspective?



Source: 451 Research. Number of responses = 639

Efficiency

Key attributes

Deduplication and in-line compression capabilities allow companies to store more data in the storage footprint by eliminating redundancies as data is being written to disk or flash.

Deduplication works well for reducing virtual machine (VM) images and files and has moved into the primary storage space.

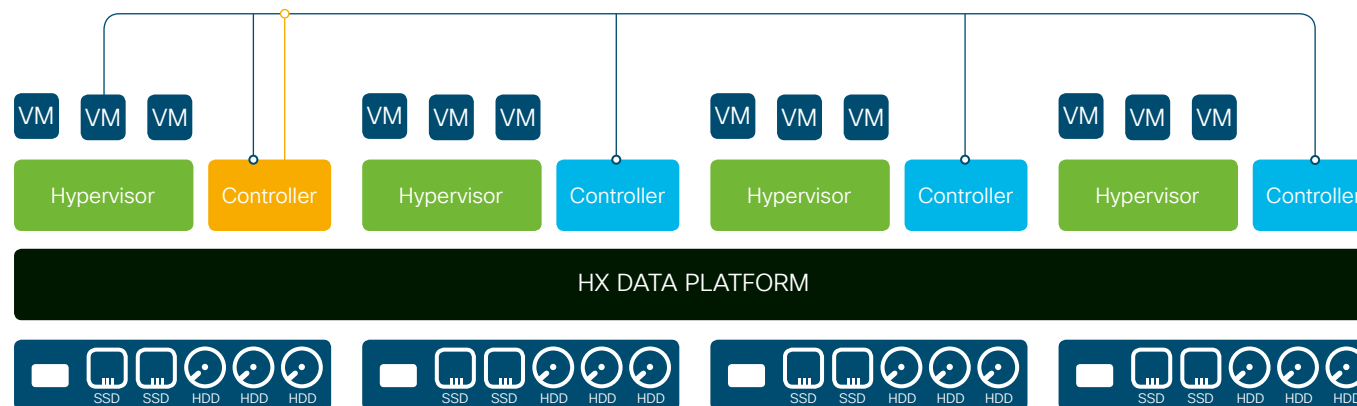
Compression has become necessary for reducing application workloads because deduplication does not work well on database workloads.

451 Research believes both have a major role to play in performance efficiency because they allow HCI nodes to cache more data within expensive flash SSDs and PCIe cards.

It recommends that HCI platforms should have automated data-placement intelligence to stripe data across multiple nodes to avoid I/O bottlenecks and ensure performance and storage capacity can scale out in a linear fashion.

Storage QoS is a further key attribute. It allows administrators to prioritise sensitive applications and guarantee performance. In the cloud provider world, storage QoS has been used to ensure that low-priority workloads do not consume excessive resources.

Built for simplicity and speed



Systems built on conventional file systems write locally, then replicate, creating performance hotspots.

With HCI, it's possible to stripe data across all nodes simultaneously, by using cache across all SSDs for fast writes.

Balanced space utilisation ensures no data migration is required following a VM migration.

Agility and adaptability

HCI must-haves

Scale-out is a common capability in existing HCI. But most solutions have a rigid architecture that forces companies to add compute, memory and storage in blocks. This can create inefficient silos where processing and storage resources are unused.

451 Research says future generations of HCI should allow customers to add these resources both independently and in a granular fashion.

To be more agile, it says HCI platforms must have:

- Common management and orchestration
- Integration with legacy data centre platforms
- Integration with well-known management tools to eliminate the need to add new ones
- A common control plane for servers, networking and storage to centralise logs and error reporting within existing tools

To become more adaptable, HCI must be able to:

- Integrate with APIs – a key requirement for organisations building a private cloud environment
- Secure sensitive data – file-level encryption as an option, plus VPN integration for securing replication streams
- Provide comprehensive auditing capabilities to track the source of breaches and data-corruption events within the organisation

Moving at the speed of business

Filling the need

In today's digital economy where the app has become king, your company must move faster than ever. It must also be extremely flexible. You need the ability to add apps and VMs quickly to handle the speed of business.

But the silos of compute, network and storage in your data centre can hold you back. Current infrastructure for the apps you need to deploy adds cost, time and inefficiency.

Much of the infrastructure available (converged stacks, storage arrays, traditional blade servers, networking) requires a degree of expertise that can hamper rapid deployment.

The drive towards HCI fills the need for moving at the speed of business. But often there's another cost – proliferation of solutions that are managed separately. This complicates infrastructure management and operations.

The final challenge is around the 'promise' of cloud economics. Note that cloud doesn't save you money – it provides simplified scaling at far more granular levels, and allows you to spend the money when you need it. For these new apps and operational models, a solution is required that helps you scale capabilities as you need it.

Chapter 3

Introducing Cisco HyperFlex

The real deal

Not all HCI solutions are created equal. Several well-known platforms do not include the network as part of the HCI stack – which means additional time and cost for your business. It also leads to scaling issues later on.

Cisco is driving rapid HCI innovations and has delivered high performance component options, intuitive management enhancements and new enterprise data protection and security features. When it comes to HCI, HyperFlex is the real deal.

“Cisco HyperFlex could be the right solution at the right time, for organisations seeking cost-effective, scalable, high performance infrastructure solutions.”

Enterprise Strategy Group



What makes HyperFlex different?

A single platform

There are various flavours of HCI competing for your attention. Not all are created equal. Several well-known platforms lack a vital ingredient in the HCI stack – the network.

Adding network as an afterthought can be costly. You'll need to set up the network, level set the bios and firmware of the servers, and expand the cluster manually. It also leads to scaling issues.

Choosing HCI that includes network by design means you have a truly converged and tightly integrated solution. That's exactly what you get with Cisco HyperFlex. It combines compute, network, storage, virtualisation and data protection into a single appliance. One that's deployed in under an hour and managed using widely adopted, familiar tools.

You can use racks and blades for independent scaling of compute and storage. Software is offered as a subscription, bringing pay-as-you-go economics to the data centre. And with our new All Flash nodes and 3rd Generation 40 Gbps UCS fabric networking, you get blazing fast performance.

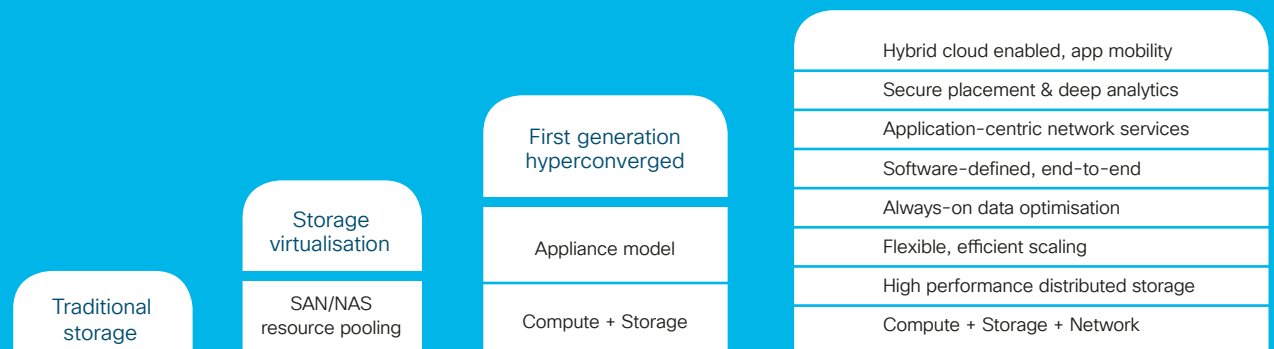
Engineered on Cisco UCS, HyperFlex works seamlessly with converged and build-your-own platforms, and third-party storage arrays. Users can manage many technologies with a path to software-defined everything (SDx), analytics, automation, orchestration, and hybrid cloud.

Cisco's next-generation HCI platform includes distributed APIs to enable an easy-to-consume infrastructure.

When combined with Cisco One Enterprise Cloud Suite (ECS), APIs can be activated using simple workflows and self-service portals.



Enterprise Cloud Suite, SDN, Analytics, Hyperflex



SAN/NAS

Hardware abstraction

Generic x86+
Software Defined
Storage (SDS)

Data centre architecture:
Systems + ASICs + Software



Next-generation hyperconverged data platform

Built from the ground up

We built the Cisco HyperFlex HX Data Platform™ from the ground up. It's a distributed file system that redefines storage technology to expand the boundaries of HCI with a wide range of enterprise-grade data management and optimisation services:

Independent scaling – designed for independent scaling of compute, caching, or capacity. This allows full flexibility to scale the environment based on your evolving business needs.

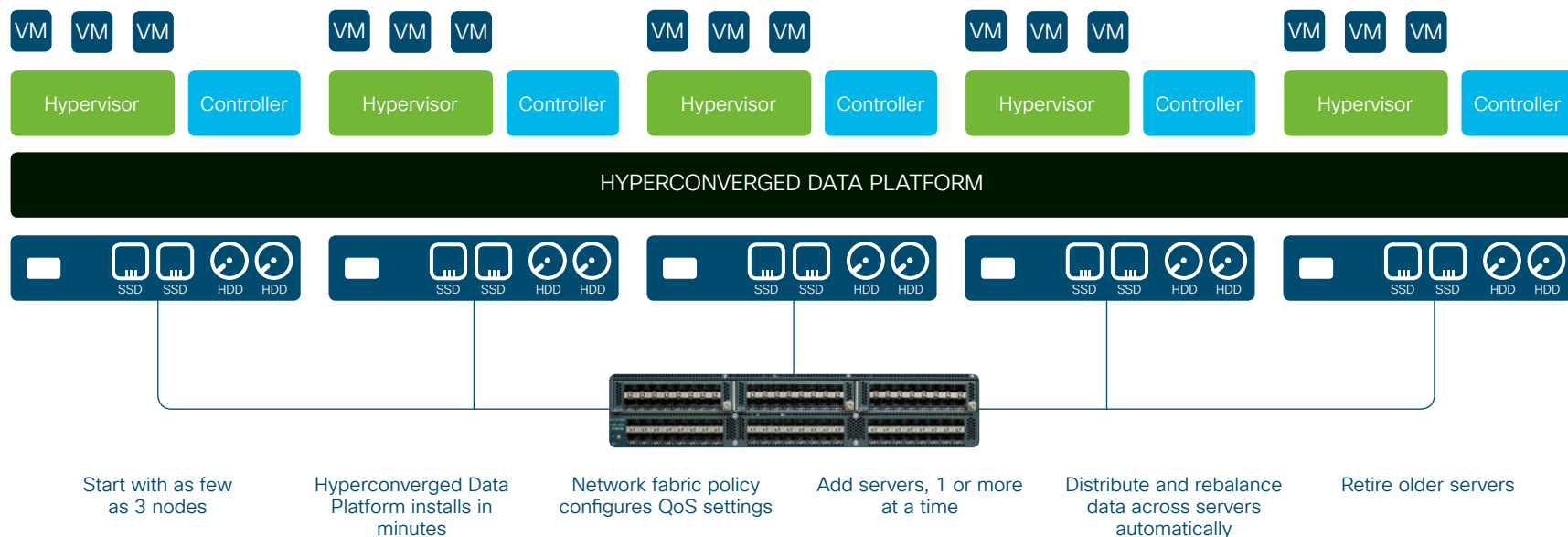
Continuous data optimisation – always-on inline data deduplication and inline compression provide efficient resource utilisation and reduce the overall IT footprint.

Simplified data management – storage functionality is integrated into existing management tools, allowing instant provisioning, cloning, and snapshotting of applications.

Dynamic data distribution – incoming data is securely distributed and optimised across servers and storage tiers in the cluster, eliminating performance bottlenecks for high I/O performance

[Learn more about the HX Data Platform](#)

Hyperconverged scale out and distributed file system



Lab-certified market leader

How HyperFlex outperforms its competitors

There's a reason why we took our time to enter the hyperconverged space. It's because we wanted to ensure we'd deliver the best HCI platform for you and your business.

To prove it, we put our money where our mouth is and commissioned the experts at Enterprise Strategy Group (ESG) to perform lab testing.

They compared HyperFlex with 3 other solutions using an industry standard benchmark for application performance on HCI. They reported that HyperFlex outpaced competing HCI solutions from multiple vendors:

- **Supports up to x3 higher VM density** – providing organisations with the best total cost of ownership (TCO) for HCI deployments
- **Lowest VM read/write latencies** – enabling HyperFlex users to bring more business-critical apps to HCI
- **x7 reduction in IOPS variability compared to other solutions** – delivering the best user experience and availability for apps

According to ESG, Cisco HyperFlex could be the right solution at the right time for businesses seeking cost-effective, scalable, high performance infrastructure solutions.

[Get the ESG report](#)

Cisco HyperFlex could be the right solution at the right time, for organisations seeking cost-effective, scalable, high performance infrastructure solutions.

ESG

One system for all workloads

Part of the Cisco Data Centre solution

Cisco's object based, policy defined approach began with the launch of the Unified Computing System (UCS) in 2009.

Cisco UCS is built to provide one operating environment across many architectures, regardless of form factor (rack or blade) or mode of operation. It spans all workload requirements and operating environments:

- Scale out / scale up
- Bare metal, virtualised, cloud & containers
- Component, converged and hyperconverged

All with common management – consistent, policy driven infrastructure. No operational or technology silos to accomplish what you need.

The singular elegance of UCS arises from the way management functionality is removed from individual elements (servers, networking, storage) and centralised in the fabric.

With the launch of Cisco Intersight, we've taken this centralised management and policy control engine and moved it to the cloud. You can now scale capacity without additional capex investment in infrastructure to manage infrastructure.

Using Intersight's artificial intelligence (AI)-infused, cloud-management tools you get deep insights into the state of your infrastructure. You will be able to identify issues before they become major problems and benefit from faster root cause identification.

Find out how you can transform your data centre for the multicloud era

UCS: Common platform for workloads and locations

The Cisco Data Centre: Powered by intent. Informed by context. Delivered across multicloud.

HyperFlex Edge
UCS Mini e-Series



ROBO

Fifth Generation UCS



Mainstream computing

UCS Integrated
Infrastructure Solutions



Converged infrastructure

HyperFlex Systems



Hyperconverged infrastructure

C-Series Rack Servers
UCS C3000 Series



Scale out

Edge

Cisco Intersight cloud management

Cloud

Chapter 4

Use cases

Do more and spend less

The apps and workloads running on HCI typically vary by size of organisation. The beauty of HCI is that you buy only what you need to match the workload.

You can start small and grow as and when needed. You can do more and spend less. And you can act faster – whether to harness new opportunities or transform the way you work.

“HCI’s ability to standardise IT resource delivery and make it service-like, combined with its integrated data-protection and data and workload-mobility enhancements make it a powerful infrastructure option for remote locations.”



Workloads vary

Buy only what you need

The beauty of HCI is that you buy only what you need to match the workload – whether that's a single rack, blade or more. It's ideal for:

- Databases and Mission Critical Application – performance and simplified management at a lower total cost of ownership (TCO)
- Virtual Desktop Infrastructure (VDI) – low upfront costs, consistent performance and predictable scaling
- Server Virtualisation (VSI) – reduces operational complexity with adaptive scaling and always-on resiliency
- Test and Development (Mode 2) – agile provisioning, frequent iterations, instant cloning and snapshots
- Remote Office / Branch Office (ROBO) – simple deployment, centralised management, no 'fly-and-fix' missions

Grand View Research reports that HCI workloads continue to evolve, but vary by organisation size:

- Small organisations prefer improving operational efficiency, major infrastructure deployment, improving ROBO IT efficiency/service, and increasing the use of server virtualisation
- Midmarket organisations focus on VDI, improving operational efficiency, major infrastructure deployment, and increasing server virtualisation
- Large enterprises aim at improving operational efficiency and backup and disaster recovery, followed by VDI, private cloud infrastructure, and cloud infrastructure services.



Databases and mission critical applications

Performance and simplified management at a lower TCO

Databases such as Microsoft SQL and Oracle are critical to run your business. Enterprise applications such as your SAP ERP are often deployed in a virtual system with a database server. As the amount of data increases, you need a flexible, scalable solution with consistent performance to deploy these databases and run your mission critical applications.

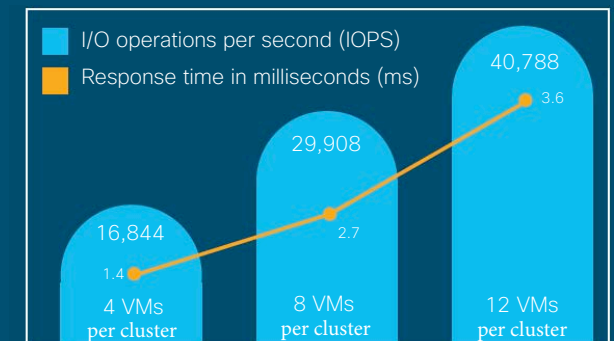
Cisco HyperFlex All-flash systems meet those database performance demands so you can power the applications your business needs dictate. And with hyperconvergence from Cisco you get the added benefits of reducing your storage footprint and costs. HyperFlex provides:

- Consistent, powerful performance - Cluster performance scales linearly with added VMs and HyperFlex's I/O per second (IOPS) is unmatched by other HCI solutions.
- Simplified management - Deployment is easy with pre-integrated clusters, while management is simple with the intuitive HyperFlex Connect GUI.
- Reduced TCO - Hyperconvergence with the higher VM density and independent scaling of HyperFlex means a lower storage footprint and cost savings for your database deployment.

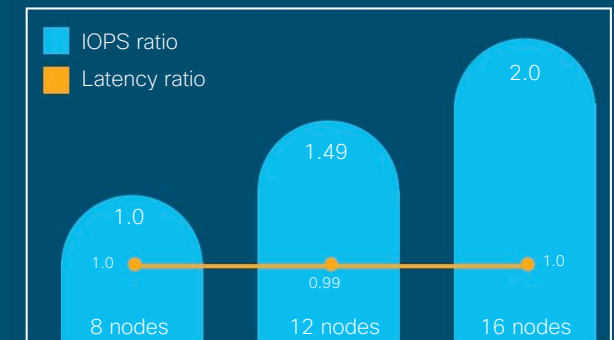
[Learn more about HyperFlex for Databases](#)

[How to run SAP Nonproduction Landscapes in a HyperFlex All-Flash system](#)

DYfZcfa UbWV'mUhtYfg



Cluster performance scales linearly as additional virtual machines are provisioned.



Cluster performance and capacity scale linearly as nodes are added to the cluster.

Virtual desktop infrastructure (VDI)

Achieve desktop efficiency

Implementing VDI environments is turning out to be more complicated than many organisations expected.

The high initial costs, ineffective scaling and unpredictable performance of network storage often inhibit the adoption of VDI technology and keep you from benefiting from desktop efficiency.

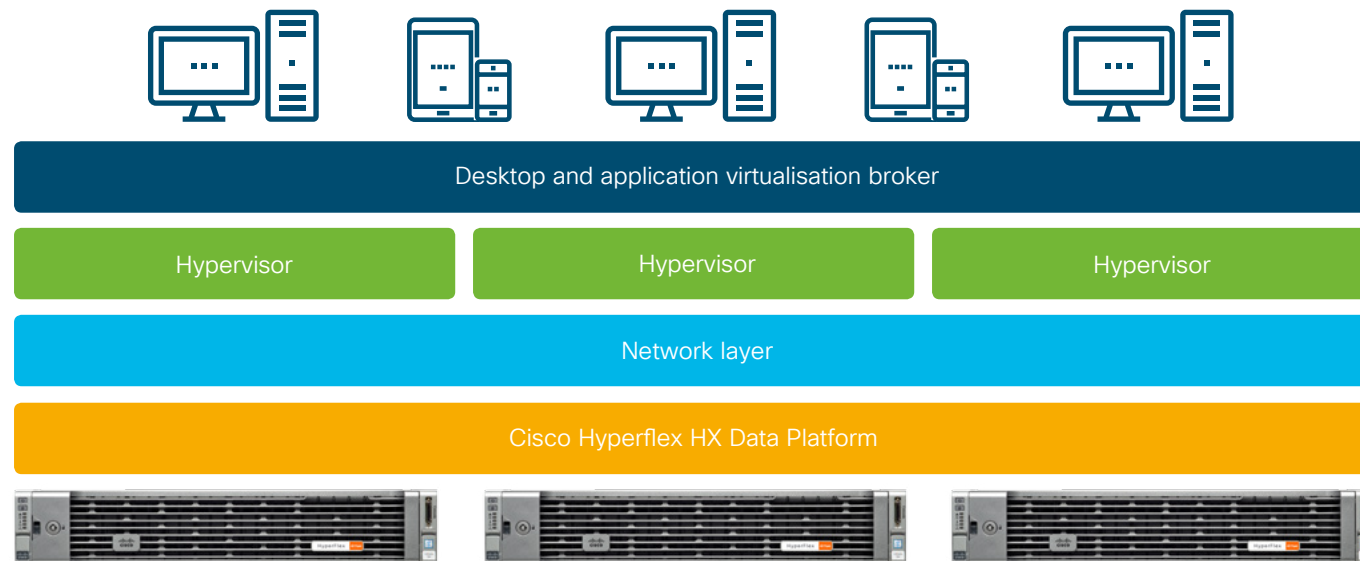
Unlike VDI solutions that use traditional SAN or NAS infrastructure, HCI combines solid-state disk (SSD) drives and spinning disks (hard-disk drives [HDDs]) into a single distributed, multi-tier, object-based data store.

An innovative caching tier stores frequently and recently used information to accelerate performance. In addition, native inline deduplication and compression are always on to help ensure that your storage resources are used optimally without adversely affecting virtual desktop and application performance.

For your business to be agile, your VDI solutions must be easy to deploy and manage. The elements in HCI are delivered as a pre-integrated cluster that's up and running in an hour or less.

[Learn more on VDI with HyperFlex](#)

The VDI stack based on Cisco Hyperflex



Server virtualisation (VSI)

A single interface

Server virtualisation is an important strategy for optimising the data centre. Yet traditional approaches to IT infrastructure and virtual server implementation have left the data centre burdened by a sprawling and complex set of VMs and storage systems that are difficult to scale, optimise and manage on a daily basis.

If you need to improve the agility of your IT organisation, simplifying the deployment and operation of your virtual server infrastructure with HCI can help.

HyperFlex comes with integrated management that detects any component plugged into the system. This makes the system self-aware and self-integrating, helping it adapt quickly to changes in hardware configuration.

You can view, manage and optimise your vSphere environments deployed on HyperFlex and other servers, as well as your related storage systems – all from a single VMware vCenter interface.

Monitoring and analysis tools are visible from the same dashboard, giving you confidence that your IT staff are aware of how your infrastructure is performing.

[Learn more on VSI with HyperFlex](#)

Test and development

Adapt quickly to workload needs

Both agile software development processes and DevOps methodologies embody a process of continuous integration. Agile development processes get software created quickly, and DevOps methodologies take them to production.

[So what if you could use the same environment for test, development, and production?](#)

Cisco HyperFlex Systems give you both with a simple unified management system. You can quickly create new environments by cloning existing ones to support both agile development processes and DevOps. The HX Data Platform is integrated into the cluster and quickly creates space-efficient clones by manipulating only meta data.

If you need to test your app at a larger scale, you can simply create more space-efficient VMs with thin-provisioned volumes. If you need more computing power or storage space in your production environment, you can add more nodes for storage, or add blade servers that expand CPU capacity, thereby tuning your cluster to deliver exactly the performance characteristics that your workload demands.

[Learn more about HyperFlex for Agile Development and DevOps](#)

Remote office / branch office (ROBO)

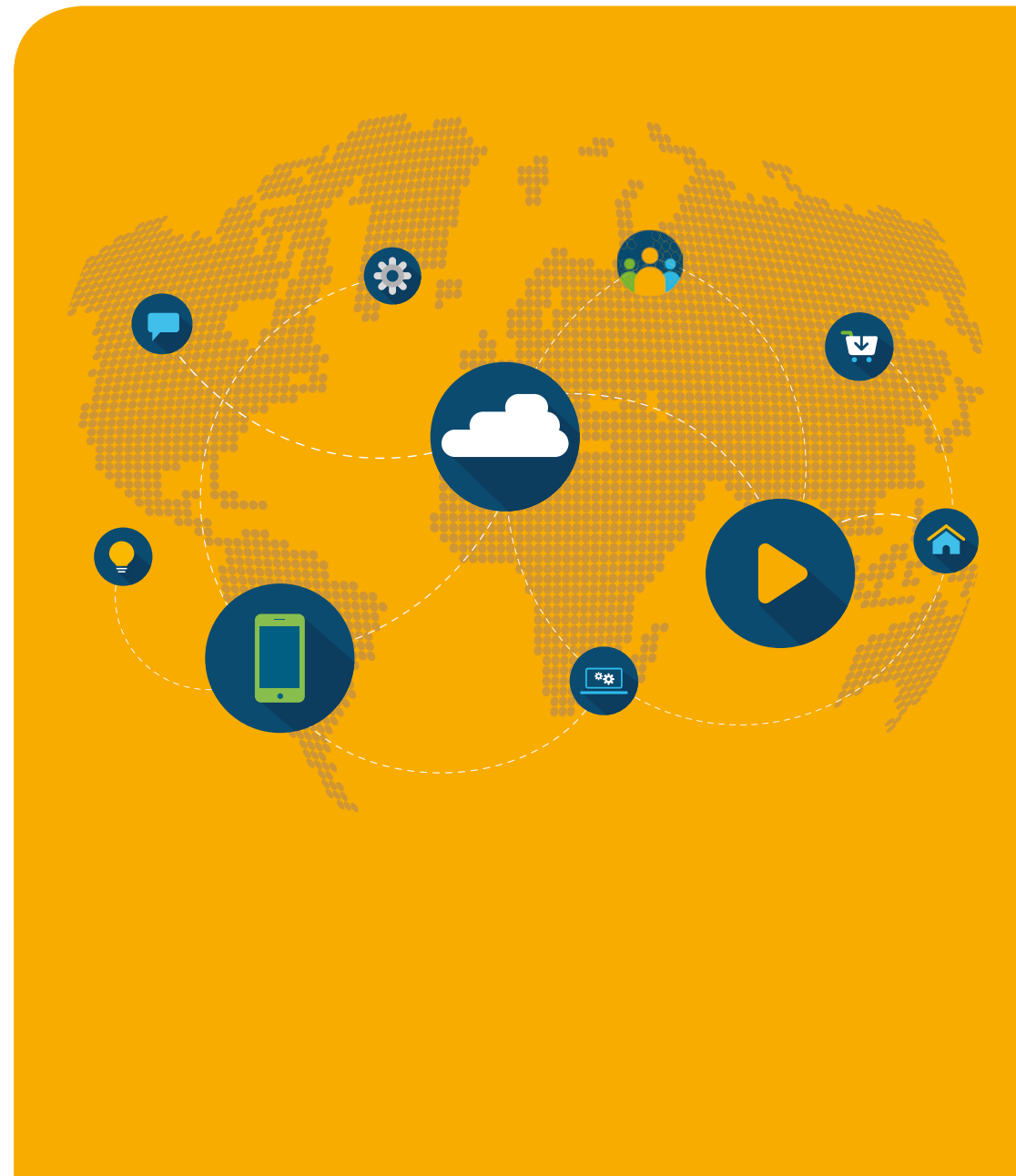
Hyperflex Edge

HCI's ability to standardise IT resource delivery and make it service-like, combined with its integrated data-protection and data and workload-mobility enhancements make it a powerful infrastructure option for remote locations.

All of the major storage pain points identified by 451 Research come into play with remote locations – i.e. capacity management, the need for disaster recovery, security and risk management. There's also the lack of skilled staff.

HyperFlex's simple deployment and centralised management features mean you can avoid 'fly-and-fix' missions, while key data-protection features such as snapshots and deduplication/compression manage data efficiently and keep your apps online. What's more, Cisco's latest addition to its HCI family, HyperFlex Edge, is tailor-made for small businesses and ROBO.

[Learn more about HyperFlex Edge for ROBO](#)



Chapter 5

Get ready for lift off

Do you want your business to make the jump to hyper speed?

With Cisco HyperFlex you get the dYfZcfa UbW'cZU' : YffUf'k jh'fY'gja d'WmicZU'J YgdU"

Your business will benefit from:

- 4H~][YbhYbX! hc! YbX'Ui hca Uhcb'! 'jbWl X]b[' bYfk cf_]b['Ui hca Uhcb
- I b]ZYX'a UbU[Ya YbhZc'f'U''k cf_'cUXg
- 4XYdYbXYbhgWU]b['cZfYgci fWg
- G]b['Y'XUHU'W'bfY'UfW]jYVWl fY'VUgYX'cb 7]gWc I 7G
- : fYUHYfJA 'XYbg]mUbX''ck Yf'UbX'a cfY' Wc:bg]ghYbhlatency

If you need agile, efficient and adaptive IT infrastructure, Cisco HyperFlex is the right choice for your business.

[Find out more](#)



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