



WHITE PAPER

Start Small and Grow Easily with FlashStack Mini

CISCO UCS MINI WITH PURE STORAGE

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Not every infrastructure problem needs a big solution. Sometimes, it's better to start small and expand your solution as your needs grow. This is especially true if your solution can be resourced and managed just like the rest of your enterprise infrastructure. Do you need smaller infrastructure resources, perhaps at remote or branch offices or at a manufacturing facility, bank branch, satellite campus, or department within your enterprise? Often these types of installations are deployed and supported by local companies, but it is costly to maintain equipment in each remote location while also trying to enforce your data center best practices across all your locations. Additionally, protecting critical business data located in remote areas or on mobile devices can be difficult. You don't have to look far to find articles in the news about the loss or misplacement of user data that cannot be controlled centrally.

FlashStack™ Mini is the latest addition to the FlashStack integrated infrastructure offering from Cisco and Pure Storage. FlashStack Mini is an enterprise-class solution optimized for smaller deployments at your remote sites and branch offices, and even in

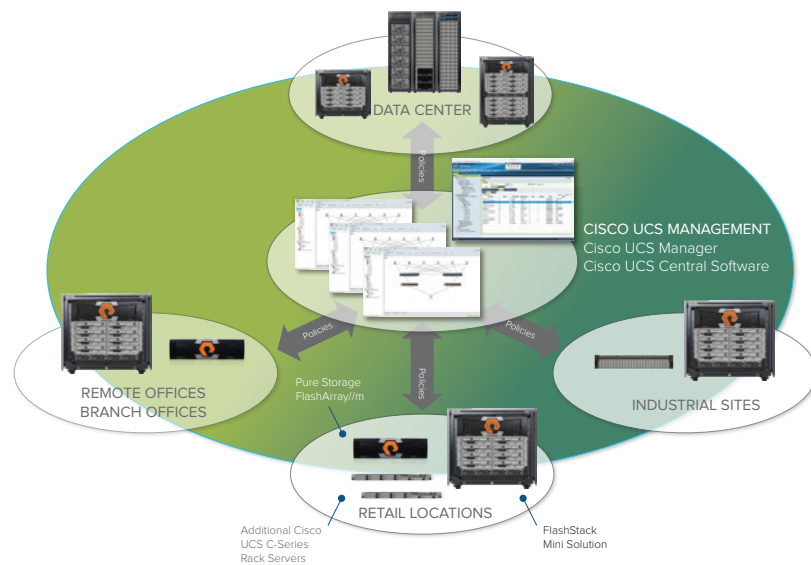
your data center. This all-in-one solution delivers servers, storage, and networking resources in an easy-to-deploy, simple-to-manage, compact form factor. This powerful solution delivers enterprise-class performance, reliability, and manageability—all at a very reasonable cost.

Like all FlashStack solutions, FlashStack Mini can be managed as a standalone entity or as part of an enterprisewide management solution using Cisco UCS® Central Software and Cisco UCS Director. These tools allow central control over configuration policies, so

you can manage your distributed IT resources with the same tools that you use to manage your enterprise data center. FlashStack Mini is a powerful foundation for the delivery of cloud services, with automation and self-service features preintegrated with Cisco UCS Director.

This document describes FlashStack Mini and the business and technical benefits delivered to your workloads in your data center, manufacturing facility, bank branch, or satellite campus. It describes the components and scalability options of this prevalidated solution.

FLASHSTACK MINI EXTENDS YOUR CURRENT INFRASTRUCTURE FROM THE DATA CENTER TO THE EDGE WITH COMMON MANAGEMENT





INTRODUCING FLASHSTACK MINI

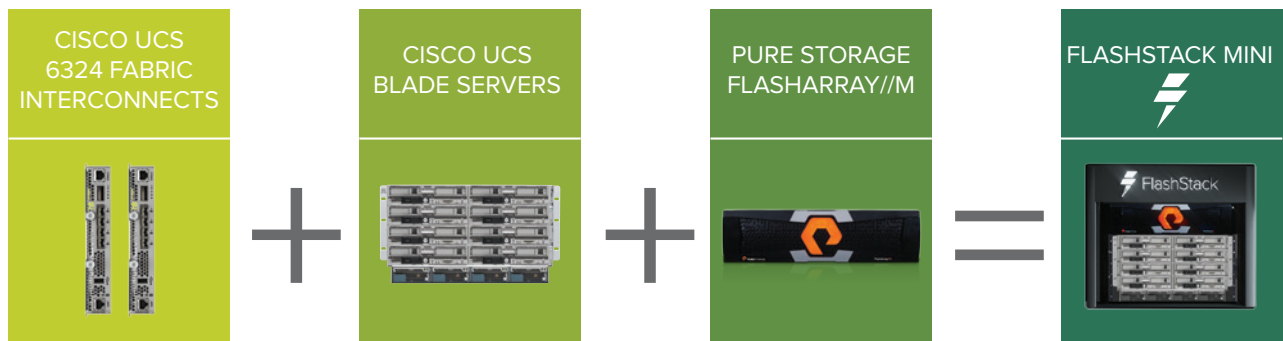
FlashStack Mini is an integrated infrastructure solution with market-leading components from Cisco and Pure Storage. FlashStack is the empowering, efficient, and evergreen platform that transforms your data center and serves as a foundation for your private cloud. It consists of a pair of Cisco Unified Computing System™ (Cisco UCS) fabric interconnects that establish a redundant, lossless, 10 Gigabit Ethernet network that carries IP, storage, and management traffic over a single set of cables (Figure 2). These fabric interconnects connect to a Cisco UCS blade server chassis that hosts up to

eight high-performance blade servers based on the latest Intel® Xeon® processors. Also connected to the high-performance fabric is a Pure Storage® FlashArray//M, built to deliver always-on access to high-performance flash-based storage in a small form factor. FlashStack Mini is managed by Cisco UCS Director, which provides workflow-based management that can extend your administrators' reach to nearly all the devices in your data center and beyond to remote offices, branch offices, retail locations, and industrial sites.

Cloud Services on a Smaller Scale

With FlashStack Mini, we make it easy for you to deploy cloud services on a smaller scale both within your data center and in remote locations. Cisco UCS Director and Cisco ONE™ Enterprise Cloud Suite help you support infrastructure as a service (IaaS), virtual desktops, and virtualized applications with workflows and automation managed from a single central console. FlashStack Mini brings all the capabilities you need to efficiently and effectively deploy and manage all your business-critical workloads regardless of where they are located—making your company more agile.

FLASHSTACK MINI COMBINES MARKET-LEADING COMPONENTS FROM CISCO AND PURE STORAGE





SO EASY ANYONE CAN USE IT

Your experience with FlashStack Mini begins with infrastructure deployment times that are shorter by 50 to 75 percent than deployment times for traditional infrastructure, giving you faster time to value. You can much more easily deploy smaller environments in your central data center or anywhere that your enterprise needs to place computing power and storage closer to users or sources of data. With FlashStack, you gain long-term ease of use through a simplified architecture that reduces capital and operating costs, and through role- and policy-based management that automates configuration tasks and empowers your administrators to focus on more important, strategic issues.

Easy Management

FlashStack Mini uses Cisco UCS management, which makes the computing and networking resources both self-aware and self-integrating. Embedded in the solution's fabric interconnects, Cisco UCS Manager recognizes any component plugged into the system and can configure a server's identity, connectivity,

and configuration without user intervention. Most important, Cisco UCS Manager provides an API so that higher-level tools with a greater scope can manipulate the hardware programmatically, with no need for human interaction.

- **Cisco UCS Central Software** extends the reach of Cisco UCS Manager role- and policy-based management to any location that is accessible through an IP network. This layer of management allows you to place computing resources close to users and sources of data without the cost of employing remote administrators for sites that otherwise do not need them.
- **Cisco UCS Director** manages your FlashStack Mini solution as a single entity. Using preintegrated workflows, Cisco UCS Director reaches the computing and networking resources through Cisco UCS Central Software, and it reaches the storage component through the comprehensive Pure Storage API. This single tool provides complete

infrastructure orchestration and management for your local and remote infrastructure. Through a workflow-based interface, it simplifies the provisioning, operation, and decommissioning of both your physical and virtual infrastructure. For example, it can provision virtual machines by interacting with the hypervisor, connecting them with computing and storage resources it has carved out of the physical devices. With a self-service interface, your users and clients can order infrastructure as a service, eliminating the need to manually intervene for most of your client needs. In addition, Cisco UCS Director can decommission your applications so that your unused resources are no longer stranded because they are allocated to applications that are no longer needed.

- **Cisco ONE Enterprise Cloud Suite** can help you establish a true private cloud using your FlashStack Mini infrastructure. This tool guides Cisco UCS Director to provision local resources for your private





cloud. It also interacts with the major cloud services to help your workloads move freely between local computing and public clouds as your data and economic parameters dictate.

With FlashStack Mini, you can eradicate the complexity of traditional data center management, eliminating the need to worry about storage pools, caching, tuning, tiering, performance troubleshooting, downtime, and major equipment upgrades when you need to grow. Today you can create solutions that essentially manage themselves, with your smartphone letting you know if anything needs attention.

The storage in this solution is, in effect, supported by a team of administrators who monitor the health of your cloud-connected all-flash array to keep you at full performance 24 hours a day, 7 days a week. Pure Storage Pure1 management software continuously collects big data insights from our global installed base to improve your storage. The solution thus handles most issues by proactively initiating repairs before you're even

aware of problems. If anything ever needs your attention, your smartphone will let you know. In fact, you need to do so little that you may even forget your storage management login password. (This has happened to a number of customers.)

Simplified Infrastructure

Cisco® SingleConnect technology brings together all the components in FlashStack Mini. It provides an easy, intelligent, and efficient way to connect and manage connectivity for your FlashStack Mini and full FlashStack system. SingleConnect technology uses a single approach way to connect:

- Rack and blade servers
- LAN, SAN, and systems management
- Physical servers and virtual machines

The key is a 10-Gbps unified fabric that carries IP, storage, and management traffic over a single lossless Ethernet network. Condensing three networks into one simplifies your environment by up to two thirds, lowering both capital and operational costs. The

fabric is implemented with a pair of Cisco UCS fabric interconnects that plug into the back of the chassis. This pair of devices gives you an active-active network that connects blade servers, rack servers, and Pure Storage systems into a highly available management domain that is self-aware and self-integrating thanks to the embedded Cisco UCS Manager.

The underlying concept of SingleConnect technology is the virtualization of every connection between and among devices, enabling you to connect virtual machines and physical servers with the same visibility, control, and security isolation. The network is wired once for the desired bandwidth, with all connections configured through software, not by reconfiguring switching devices and network interface cards (NICs).

Enhancing the "wire-once" proposition, Cisco UCS virtual interface cards (VICs) present up to 256 devices to the host operating system or hypervisor. These devices can be configured on demand, so a single card can serve all your connectivity needs.





For example, you can create all the devices to support VMware® best practices for isolated management, storage data, virtual machine movement, and production network traffic. If you choose to implement Cisco Data Center Virtual Machine Fabric Extender (VM-FEX) technology, you can connect virtual machines directly to their own dedicated interfaces, which remain connected as a virtual machine

migrates between servers.

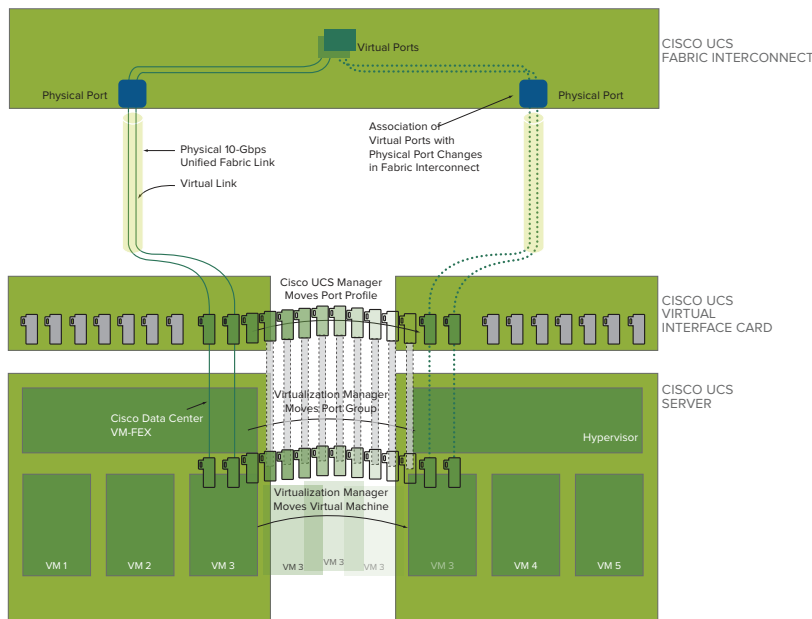
EFFICIENT

FlashStack Mini increases efficiency by simplifying your data center architecture. Now your staff and business can become more efficient and more effective by automating and standardizing IT processes.

With FlashStack Mini, you can move toward effortless computing

that is fully cloud connected, with management, analytics, support, and protection delivered as services, and with big data insights derived from a global installed base of customers to help continuously improve your environment. Imagine deploying and redeploying infrastructure with point-and-click simplicity. Imagine storage that automatically creates snapshots of your data and backs it up, providing application-consistent recovery anytime and anywhere at the click of a button.

CISCO VICS WITH VM-FEX TECHNOLOGY ALLOWS VIRTUAL MACHINES TO HAVE DEDICATED I/O DEVICES THAT MOVE WITH THEM



With Enterprise Cloud Suite, you can automatically build and manage private clouds anywhere in your enterprise. We went beyond manual integration of components to implement a model in which policies guide configuration—a model that scales and allows routine tasks to be completely automated. FlashStack Mini enables you to transform your IT practices and economics in ways that offer new advantages for your business.

RELIABLE

FlashStack Mini is designed to be highly available with redundant



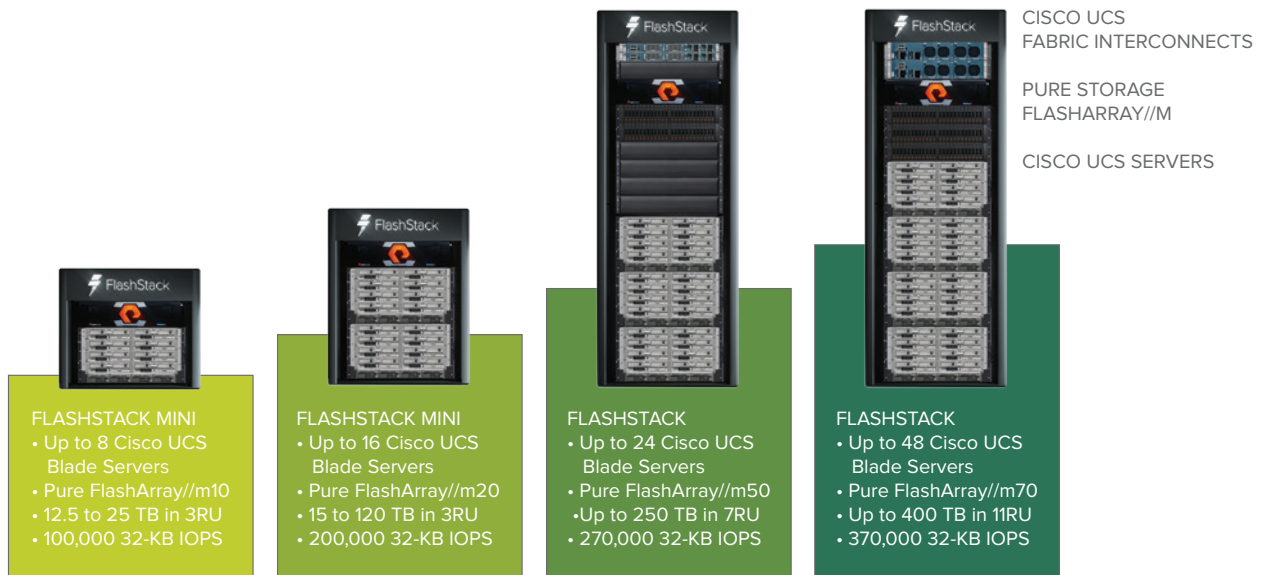
and resilient components that keep your system running even through most single-component failures. Its redundant fabric and components keep vital workloads online. Pure Storage arrays have proven, field-measured, 99.9999 percent availability, which contributes significantly to overall FlashStack Mini availability.

SCALABLE

FlashStack Mini allows you to run any workload on any resource with dynamic provisioning, making it the ultimate platform for building private clouds. Its modular design delivers linear, predictable scaling of virtualized and private cloud environments. This solution is especially practical for small data center deployments and remote- and branch-office environments

because it allows you to start small and grow as your needs change. You can begin with FlashStack Mini, scaling transparently to a FlashStack Mini with two chassis and support for 16 blades. This integrated infrastructure enables you then to scale to the much larger FlashStack with support for up to 160 blades. With FlashStack Mini and FlashStack, you can scale computing, networking,

FLASHSTACK MINI INDEPENDENTLY SCALES COMPUTING, NETWORKING, AND STORAGE PERFORMANCE AND CAPACITY ALL THE WAY TO FLASHSTACK AS YOUR BUSINESS NEEDS DEMAND





and storage components independently. We help you scale granularly, too, improving performance, bandwidth, or capacity only as you need to do so.

COST-EFFECTIVE WITH LOWER TCO AND FAST ROI

FlashStack Mini requires fewer networking components, such as cables, switches, and network adapters, than traditional blade and rack architectures. This design lowers the cost from the start. FlashStack Mini also comes with intelligent model-based management rather than requiring you to purchase all the additional management modules that most other vendors require for even basic management. The embedded management automatically integrates with your enterprise Cisco UCS Director, Cisco UCS Central Software, and Enterprise Cloud Suite, reducing your total cost of ownership (TCO).

This all-flash solution also uses all-flash cost-effective storage and offers the following benefits:

- You don't need to purchase as much storage capacity

to increase performance.

Traditional spinning-disk storage systems need more drives to perform I/O processing in parallel to achieve higher levels of bandwidth.

- Integrated data reduction from the Pure Storage FlashArray//M delivers, on average, a five-fold reduction in stored data. For virtual desktop infrastructure (VDI), the data reduction is even greater, and the cost for storage can be as low as US\$50 per virtual desktop.

The solution's tight integration with Cisco UCS Director, with prebuilt workflows for automated deployment, management, and scaling, greatly reduces operating costs. For example, St. Luke's Hospital achieved a 234 percent ROI with a three-month payback period on their VDI deployment.

The solution's small form factor requires less energy for power and cooling, making it a cost-effective solution for remote-office and branch-office (ROBO) deployments and for other smaller enterprise environments.

FAST

The solution combines the performance of all-flash storage with record-setting performance on real-world applications. Cisco UCS has achieved more than 126 world-record performance records on industry-standard benchmarks. This all-flash solution delivers data to the processors faster than spinning disks can. All FlashStack solutions deliver nondisruptive operations, an exceptional end-user experience, outstanding density of virtual machines per host, and exceptional flash storage performance. A 10-Gbps unified fabric along with the capability to burst up to 40 Gbps of I/O on a single blade server provides room for massive growth while maintaining performance. For example, we have tested this solution under strenuous workloads, such as large-scale virtual desktop environments, to prove its resilience in production environments.

INVESTMENT PROTECTION

FlashStack Mini is evergreen architecture that allows you to continuously update your environment without ever having





to undertake a major equipment upgrade to do so. After you set up the system, you can upgrade and scale it in place. You can add new storage without disruption. You can add new computing components, which will be automatically configured into resource pools, ready for use. The stateless nature of Cisco UCS enables the fastest possible upgrades of blade servers to next-generation servers while preserving investment in the chassis itself. New generations of networking technology can provide increased bandwidth with a simple swap of components.

You can stay modern, keep every component of FlashStack up-to-date, and continuously capture the value of technological change over time—without having to reinvest in the fundamental solution.

VALIDATED FLASHSTACK MINI PRIVATE CLOUD REFERENCE ARCHITECTURES

FlashStack Mini is built with trusted components from Cisco and Pure Storage. It is specifically designed to support virtualized applications, virtual desktop environments, and private cloud workloads. It supports VMware vSphere®,

Microsoft® Hyper-V®, and other virtualization platforms. It is well suited for midsized businesses and for smaller deployments within larger enterprises. These applications include ROBO deployments and areas that require a specific management or failure domain, including proof-of-concept, prototyping, staging, training, and development and test environments.

With storage, computing, network, and virtualization capabilities rolled into one, FlashStack Mini provides a comprehensive solution

FLASHSTACK MINI COMPONENTS

COMPUTING	STORAGE	NETWORKING
Cisco UCS Mini: <ul style="list-style-type: none"> • 1 or 2 Cisco UCS 5108 Blade Server Chassis • Up to 8 Cisco UCS B-Series Blade Servers in each chassis • Cisco UCS VIC Scales up to 160 blades and 20 chassis when upgraded to standard FlashStack	Pure Storage FlashArray//M <ul style="list-style-type: none"> • Up to 25 TB of effective capacity in 3 rack units (3RU; with //M10) • Approximately 100,000 32-KB I/O operations per second (IOPS) • 16-Gbps Fibre Channel • 10-Gbps Small Computer System Interface over IP (iSCSI) Scales to 1.5 PB and up to 370,000 IOPS when nondisruptively upgraded to the //M20, 50, or 70	2 Cisco UCS 6324 Fabric Interconnects





that can scale up based on your business needs. You can start with a small configuration of two blades and scale up to support 16 blades within a single FlashStack Mini. You can also upgrade to a larger FlashStack configuration that can scale to 160 blades, up to 15 petabytes (PB) of storage, and up to 40 Gbps of bandwidth per blade when configured with the latest Cisco UCS fabric interconnects.

Cisco and Pure Storage have worked together to test and create reference architectures to accelerate your solution deployment and reduce risk. These reference architectures enable you to quickly deploy and create value in your business.

SUPERCHARGE YOUR SMALL, REMOTE, AND BRANCH DEPLOYMENTS

Why bring in a big solution from the start when you can start small and grow as your needs change? This enterprise-class solution is great for your midsize business, ROBO deployment, or small deployments within an enterprise data center. FlashStack Mini delivers all-flash performance and no-compromise enterprise capabilities in an efficient form factor as small as 9RU. You have a choice of virtualization platform. Why not choose a preintegrated solution with common management that offers an excellent private cloud platform? FlashStack reduces

complexity and costs, lowering your TCO, and provides fast ROI. This solution is fully tested, validated, and documented to facilitate rapid and repeatable deployment. FlashStack was originally designed for the data center. FlashStack Mini, part of the FlashStack family of integrated infrastructure, provides true enterprise power and features optimized for ROBO, point-of-sale, and small IT environments.

FOR MORE INFORMATION

For additional information, see:

- www.cisco.com/go/flashstack





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