

White Paper

Hyperconverged Infrastructure Shrinks Complexity and Cost for VDI

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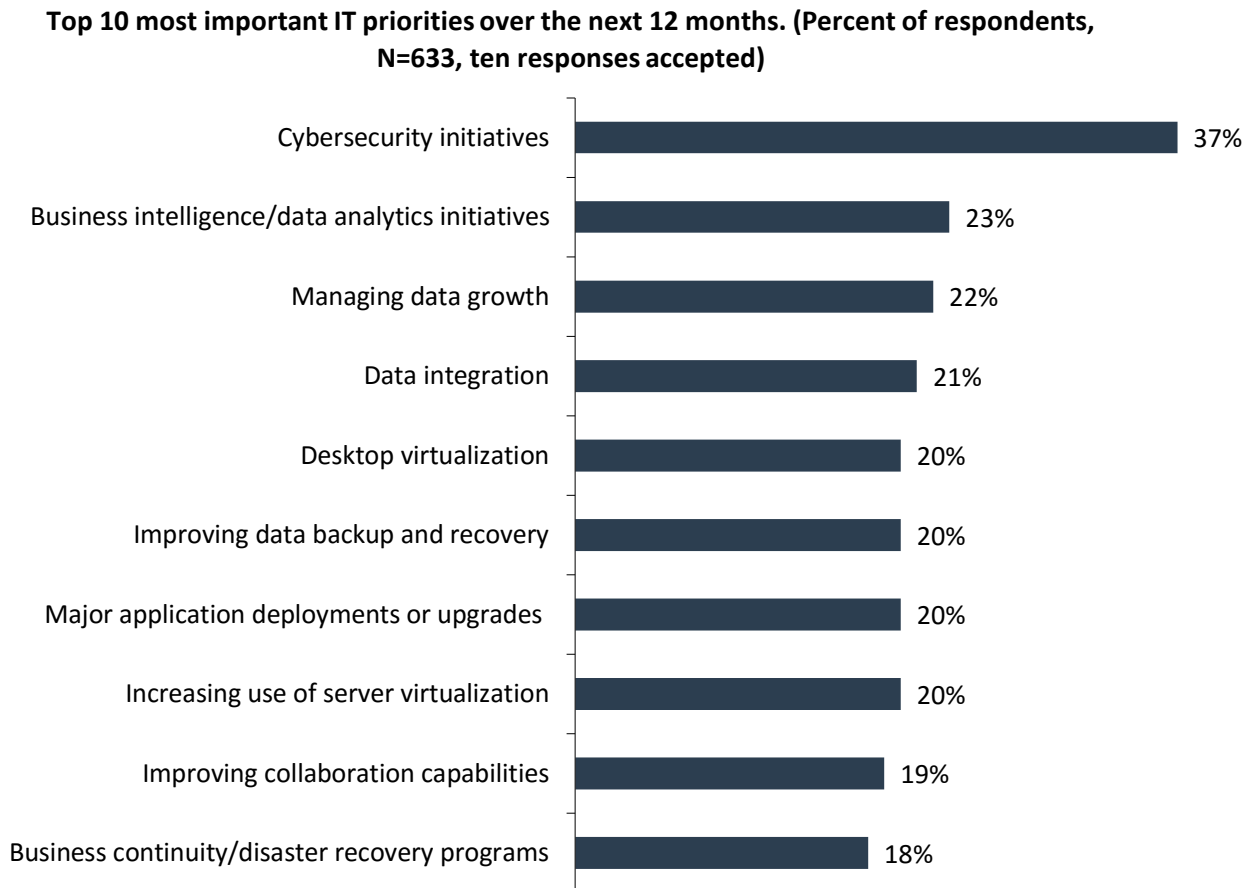
Contents

Desktop and Application Virtualization Improve User and IT Productivity	3
What Has Traditionally Held Back Organizations	3
Expensive and Complex Infrastructure	4
Not Taking User Experience into Consideration	4
Not Accounting for the Operational Impact	4
A New Path Forward	4
Hyperconverged Infrastructure (HCI).....	5
VMware Hyper-Converged Software for HCI and Converged Appliances	6
Customer Success with HCI and Virtual Desktops and Applications	7
The Bigger Truth	9

Desktop and Application Virtualization Improve User and IT Productivity

Desktop and application virtualization have steadily gained ground to address a broad range of use cases across organizations of all sizes. According to ESG research, over the past few years, desktop virtualization has consistently risen to be included among the five most commonly-identified IT priorities for 2016, alongside such perennial corporate objectives as fortifying cybersecurity and managing data growth (see Figure 1).¹ However, many organizations that could greatly gain from this technology have, until now, shied away from it due to the costs and complexities often associated with getting started—which is why selecting the right solution and the optimal underlying infrastructure is so critical.

Figure 1. Ten Most Commonly Identified IT Priorities for 2016



Source: Enterprise Strategy Group, 2016

Delivering applications and desktops to employees can have favorable benefits such as improved security and productivity, but there are some short- and long-term considerations that factor into the decision process. This paper will walk you through some of the challenges to be aware of, and the modern approaches that can make life easier, reduce costs, and ensure end-users are productive.

What Has Traditionally Held Back Organizations

Until recently, many organizations have faced a number of hurdles when getting started, due to cumbersome proofs of concept, uncertain performance characteristics, difficulty scaling, and unfavorable economics. These issues have often

¹ Source: ESG Research Report, [2016 IT Spending Intentions Survey](#), February 2016.

made it difficult for organizations to get their projects off the ground, or to successfully expand deployments to address new use cases. Key challenges include the following.

Expensive and Complex Infrastructure

Organizations often opt to deploy VDI using familiar infrastructure they know how to operate—DIY. But this has its risks. The process can take six, 12, even 18 months to pull together the components and deploy them properly—and demands cooperation among multiple siloed teams, such as server, storage, networking, virtualization, desktop, and security teams. In addition, initial configuration and setup often only focus on the needs of the first wave of users and do not take future use cases or needs into account. This can often lead to organizations undersizing their architecture, which can severely impact user experience as a rollout progresses.

DIY infrastructure is also often difficult to troubleshoot, especially if the VDI infrastructure is comingled with other applications. Root-cause analysis is a complex undertaking in this scenario. Finally, desktop and application virtualization is user-centric, with each user or use case requiring a unique workload with a specific I/O profile, and, in light of these demands, the traditional setup of servers/storage/networks can be complicated.

Not Taking User Experience into Consideration

One characteristic that separates virtualized desktops and applications from other virtualization solutions is that the user experience is *the* metric for success. Unhappy users mean a failed deployment. Virtual applications and desktops are 100% in the user's lap, so a flaw in the architecture can result in degraded performance—or even a complete productivity shutdown—for hundreds or thousands of users.

Virtual desktop and application workloads are unique. For example, a common complaint among users is initial login time. VDI architectures must be designed to accommodate boot and login storms, as well as to be able to sustain performance during virus scanning and patching. In addition, today's users are more demanding than in the past, so an application and desktop virtualization solution should include an element of monitoring to ensure that if something goes wrong or is not working the way it should, IT can quickly remediate and troubleshoot the problem to quickly get the end-user back online.

Not Accounting for the Operational Impact

Ultimately, your infrastructure must be designed to maintain performance during maintenance activities such as patches and upgrades. That takes some effort. Onboarding and provisioning are another consideration. Historically, onboarding new users and provisioning desktops have been extremely time-consuming tasks that can take days or weeks, require input and cooperation among multiple IT domains, and place a heavy burden on storage. And if the design is not future-proofed or demand exceeds expectations, an entirely new design effort may be needed to scale the environment.

Clearly, VDI requires some up-front considerations. How you deploy your infrastructure can alleviate many of the challenges, while also improving day-to-day operations and enhancing the user experience.

A New Path Forward

Fortunately today, organizations can avoid these challenges, at the same time simplifying infrastructure rollouts and maintenance, improving user experience, and scaling out easily, when needed. But this relies on understanding use cases, planning, and making some smart decisions when it comes to the solutions you choose along the way. DIY infrastructure should no longer delay the success of application and desktop delivery. Now, modern infrastructure choices—delivered 100% as software solutions or preconfigured into simple-to-consume appliances that scale as the business grows—have become a very attractive investment option.

Hyperconverged Infrastructure (HCI)

Hyperconverged Infrastructure (HCI) solutions offer a modular approach to building virtual desktop infrastructure (VDI), which greatly simplifies the planning, design and rollout of virtual desktops and applications. Hyperconverged infrastructure appliances typically include compute, storage, network, hypervisor, and management resources all in a single appliance, which is tuned and pre-tested for specific workloads. These appliances allow IT to purchase and deploy infrastructure in bite-sized chunks, sidestepping high, up-front capital expenditures. And management automation and pre-configuration make it easy to get up and running quickly.

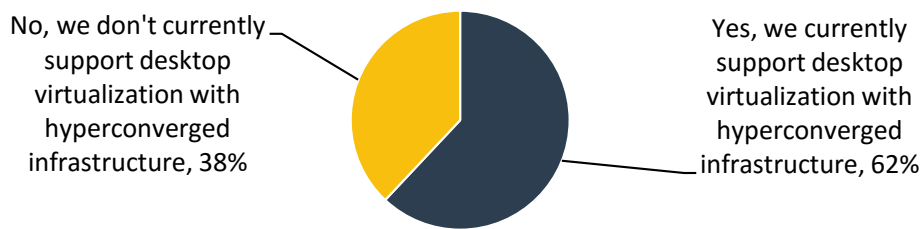
Software-defined storage is the cornerstone of hyperconverged infrastructure. This technology allows workloads to access local storage, which provides excellent IOPS performance and allows storage to be added within the appliance, in smaller chunks. The performance benefits of local storage are ideal for virtual application and desktop workloads. Local storage eliminates many of the complexities associated with traditional storage arrays, such as latency caused by the network, solid-state storage configuration, and hardware issues. Furthermore, local storage often consists of flash memory, which has virtually unlimited IOPS to accommodate a large number of users. This helps reduce or eliminate the “boot-storm” problems associated with desktop and application workloads. With software-defined storage, policy and quality of service can also be easily configured. In this way, you can define which users will receive higher levels of protection and performance. These performance benefits make software-defined storage and HCI ideal when supporting virtual desktops and applications.

Most VDI deployments start small and expand by group or department. With the addition of various applications, things can be thrown off balance—you may not be able to meet the initial density target, and could introduce significant difficulty in sizing the environment and meeting end-user performance expectations. In essence, you now have to account for less predictable workloads sharing resources.

When used for virtual desktop and application workloads, hyperconverged appliances are sized for a certain number of users. When you need to scale, you simply add an appliance, or perhaps a single node. It’s simple, fast, and predictable, and allows IT to confidently size and scale as needed—without having to future-proof and incur massive investments. This makes cost and performance predictable. These solutions easily scale based on demand, allowing organizations to start with a targeted use case and a relatively small number of users, and scale linearly by adding appliances as needed— saving on up-front CapEx and easing cash flow. HCI is a welcome alternative to the long and arduous DIY process. According to ESG research, among current users of hyperconverged infrastructure, nearly two-thirds use these solutions to support desktop virtualization deployments (see Figure 2).²

Figure 2. Supporting Desktop Virtualization with Hyperconverged Infrastructure

Does your organization currently support desktop virtualization (e.g., VDI) with hyperconverged infrastructure? (Percent of respondents, N=45, current HCI users only)

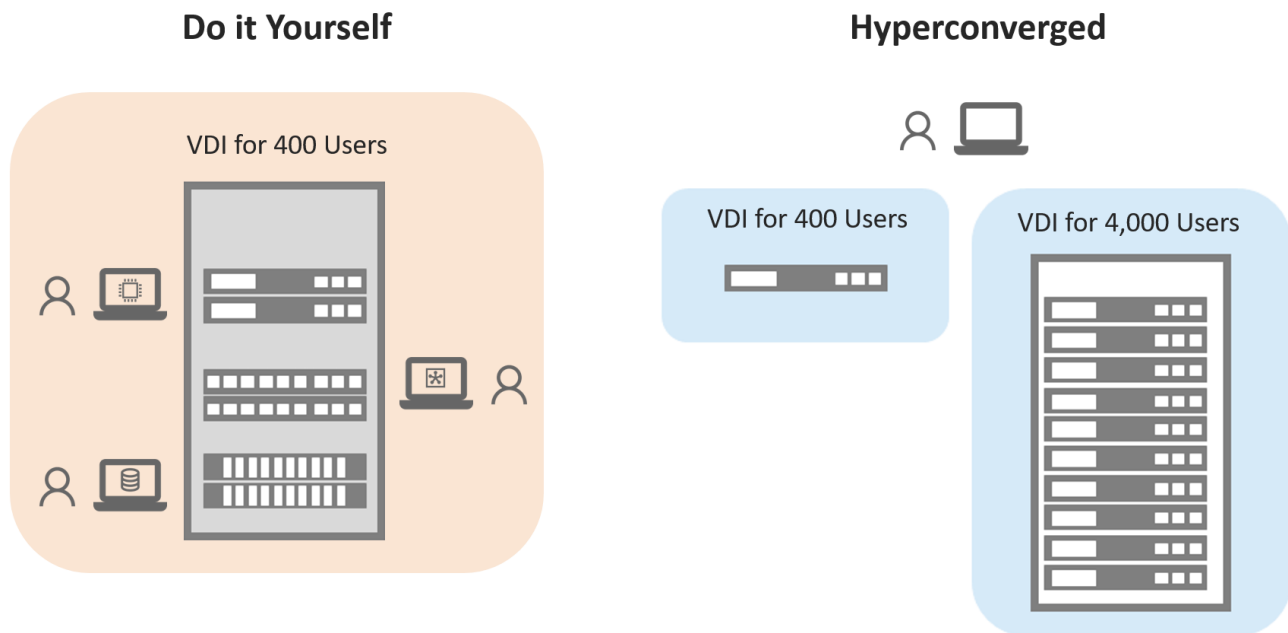


Source: Enterprise Strategy Group, 2016

² Source: ESG Research Report, [The Cloud Computing Spectrum, from Private to Hybrid](#), March 2016.

Figure 3 shows some of the benefits that HCI offers over DIY for virtual desktops and applications. The left side shows a traditional infrastructure for 400 end-users: discrete, non-integrated components that are separately managed by different administrators and hard to scale. In contrast, the HCI infrastructure for 400 users is integrated in a single unit that can be managed by one administrator. To expand to 4,000 users, organizations can simply add more nodes.

Figure 3. VDI Infrastructure Options: DIY versus HCI



Source: Enterprise Strategy Group, 2016

Virtual desktops and applications on HCI can be your “VDI in a box,” and include workload-specific improvements such as graphics processing or offload cards, and pre-configured data protection, deduplication, and compression. Because VDI is software-defined, it is much simpler to manipulate the components to address specific workloads and objectives. IT professionals benefit from avoiding complex infrastructure interdependencies, and can embrace automation with improved operational simplicity.

VMware Hyper-Converged Software for HCI and Converged Appliances

A hyperconverged software stack is the secret sauce that powers hyperconverged and converged appliances. VMware Hyper-Converged Software (VMware HCS) is a highly integrated, all-VMware stack that works seamlessly together, enabling you to manage the infrastructure as a single system with familiar tools.

At its core, the VMware Hyper-Converged Software stack is built on vSphere, vCenter Server, and Virtual SAN, bringing together the simplicity, agility, and manageability of software-defined storage into the world’s leading virtualization platform. An enabler for the modular, hyperconverged architecture, VMware’s Virtual SAN is integrated into the hypervisor at the kernel level for unmatched CPU and memory performance and support of maximum VM density.

There are several HCI and converged appliances ideal for VDI deployments that leverage VMware HCS. Dell EMC’s VxRail is a highly integrated appliance that is pre-configured and tested for easy installation. VxRail provides off-the-shelf compatibility and a single point of support. VSAN Ready Nodes also leverage VMware’s Hyper-Converged Software stack,

and are available through a wide range of hardware vendors. VMware HCS is also available as part of a number of VSAN ready-node appliances. With these choices, VMware offers simplicity and scalability for desktop and application virtualization, as well as high performance and lower costs, while delivering an enhanced user experience.³

Customer Success with HCI and Virtual Desktops and Applications

Customers of all sizes are taking advantage of the cost, simplicity, and enhanced user experience this joint solution provides within their environments. ESG recently spoke with several customers about what it was like to step away from the burden of three-tier infrastructure architectures, simplify roll out and management decisions and, at the same time, drive down their overall costs.

Retail. With more than 3,000 stores across 50 states, Rent-A-Center is a familiar name for a variety of rent-to-own merchandise. Recently the organization needed to upgrade its computing infrastructure and had to make some choices. Michael Conroy, Senior Director of Technical Operations at Rent-A-Center (RAC) headquarters in Plano, TX, spoke with ESG about how RAC's existing, aged-out Citrix farm gave them the incentive they needed to deploy VMware Horizon.

Before VxRail, RAC used a standard three-tier system: networking, server blades, and separate storage. Issues plaguing the system encompassed infrastructure incompatibility, driver dependency issues (storage and host levels), and networking difficulties.

Rather than fix a failing system, RAC decided to go with a hyperconverged infrastructure solution. They chose VxRail based on the integration level between the product (at that time it was EMC) and VMware, and the fact that other products they evaluated had scaling problems.

The initial project scope was for 1,000 users at RAC headquarters. The second part of the plan was to make the system viable to 15,000-25,000 store users in the field. Background: When the Citrix farm was built, the needs of field users—standard business users, and offshore developers, weren't taken into consideration. This translated into a very unmanageable system, and Conroy's staff constantly found themselves unable to access everything through standard access, so they began keeping "jump boxes" under their desks. This expensive, fragile, and cumbersome method of gaining access is no way to work, and Conroy is already eliminating that practice—by provisioning 25 workspaces with VDI sessions that include the tools needed to easily manage the system. While some users are still leveraging the Citrix farm or hosted desktop solution, Conroy anticipates all users migrating to the Horizon solution and VxRail in the fourth quarter of 2016.

Engineers in the data center implementing VxRail were impressed with the speed and ease of implementation. Says Conroy, "With VxRail, and the right support staff, networks were laid down and nodes initialized in a couple of hours, and we anticipate infrastructure administration will be a four-to-one reduction of what it was previously, (two-to-one at the very minimum). With the alerts correctly set, we're hoping only one person will need to check the system a couple of times a week to ensure we're not running out of resources."

Over the next year, Conroy will be looking at their field infrastructure to decide if they're going to run things on a hosted desktop deployment, or on a cloud-based solution. "Regardless of what we choose, we're grateful to Mobius Partners for assisting us with our Horizon install."

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³ Another option, while not hyperconverged, is VMware EVO SDDC, a reference architecture solution that leverages pre-qualified hardware with an integrated software stack.

Though they're just beginning to use VxRail, RAC anticipates quickly garnering great benefits from their VMware implementation—system stability, ease of management, simplified scalability, predictable CapEx, and lower OpEx costs.

Education. Oregon State University has more than 28,000 students and more than 12,000 employees. Alan Sprague, the Senior System Administrator at the school's College of Business, oversees and manages the school's labs and classrooms for approximately 3,000 students and 170 faculty members and staff. He spoke with ESG about how VMware technologies like VSAN and VSAN Ready Nodes have helped increase system performance storage for their write-intensive VDI workloads, streamline system management and maintenance, and reduce CapEx and OpEx costs.

Says Sprague, "We'd made a large investment in a number of servers with local storage, and the system couldn't handle the IOPS load anymore. With a new \$50 million building for the College of Business (COB), we knew the demand for our labs would increase dramatically—and this helped drive our move to VSAN.

We went from VSAN beta to deployment over four days, across five servers, and quickly converted over our labs from original storage to VSAN. In doing this, we met our churn requirements (allowing 50 people to stand up and 50 people to sit down in under ten minutes (time between classes)—for under \$20,000! With VSAN, the amount of time to turn over the labs dropped dramatically—from 20 minutes—to four minutes. At the time, no other solution could provide what was needed for the IOPS load we had, and still have, (with as many as 1,000 unique logins per day), for that price."

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Turning over a new lab image with VDI now takes one to one-and-one-half hours. Previously, it took seven days to lay down an image across machines.

"Seven days to one hour is a massive difference, and our customer service has increased dramatically," says Sprague.

Approximately 200 lab seats run Horizon 6.1 (they ran Horizon 6.0 when they first moved into the new space). VSAN is run on all the VDI desktops, with 90% of the infrastructure non-persistent cloned desktops that refresh on login. They have 30 seats of vGPU in one lab, two seats in another lab, and an additional six seats for remote labs.

As the lab environment has grown, Sprague has turned to VSAN Ready Nodes to scale quickly and easily. COB benefits from using VSAN Ready Nodes include:

- Easy budgeting, lower CapEx: "VSAN allows cost predictability for each server, and associated resources. If the faculty says they're bringing on new campus classes with another 300 students, we can say it will cost \$23,000—and we can have it done in a week."
- Scalability and manageability. Scalability in an educational space previously meant buying a rack at \$180,000. Now, the COB can buy just one server at a time.
- Streamlined resources. Trained students are able to rack and stack a new server, turn it on, and deploy new desktops in less than two hours, freeing up Sprague for more important tasks.

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Desktop and application virtualization is transparent to the students and doesn't interfere with the learning process. New remote labs provide distance users with an "on campus experience," while instructors don't need to take months to modify their existing curricula. Horizon desktop and application virtualization solutions and VSAN technology have helped them streamline management and lower OpEx.

Education. A Systems Analyst in the Digital Initiatives and Information Technology department at UCLA, Cindy Kimmick helped deploy a large VDI implementation as part of a state-of-the-art library renovation in 2011. With a deployment of 150 desktops, she witnessed that the desktops “ran amazingly fast because desktops and apps are in the data center, on the fast network, rather than on their PCs outside.” Her department replaced aging PCs with HP thin clients since they enabled both public and UCLA logon access to a predictable environment, which included applications too expensive for students to purchase.

Fast-forward to 2015: Kimmick learned that the original VDI solution would no longer be supported by the IT vendor. After attending VMworld 2015, Kimmick discovered VMware Horizon Air Hybrid-Mode, and was attracted to the solution’s ease of use, and enthusiastic about being an early adopter.

Kimmick is delighted with the speed at which VMware Horizon Air spins up desktops, and was elated by its simplicity: “It’s the hybrid cloud. Being able to use something internal to your organization, or hybrid cloud, with the same management interface, is so much simpler for the people administrating and troubleshooting it, and easier to train people how to use it.” As they continue to scale Horizon Air Hybrid-Mode on VMware’s HCS-powered VSAN Ready Nodes, Kimmick is excited that the IT department will be able to focus on initiatives unique to the UCLA library, rather than running a data center.

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The Bigger Truth

Virtual desktop and application services have transformed the way organizations provide employees with the tools they need to be productive. Employees today expect a complete and robust user experience, with access to all the applications and data they need across all of their devices. At the same time, IT must deliver environments that are secure, efficient, and available. This is still a tall order, but new technologies that pair hyperconverged and converged appliances with virtual desktops and applications are making it much easier and with lower up-front cost. Moving desktop services into the data center and away from individual PCs makes it easier to provide what employees need regardless of their location or device, and it enables IT to consolidate infrastructure, better maintain and upgrade applications, improve data security and compliance, and reduce costs.

Good user experience is critical to the success of desktop and application virtualization. You can make it more secure and easier for IT to manage, but if the user experience suffers, your implementation will fail. Essentially, how you deploy the infrastructure has a direct impact on your success. The do-it-yourself method may be familiar, but the complexity and time it takes are a drain on productivity. Hyperconverged and converged infrastructure solutions offer complete solutions with high integration, greatly simplifying and speeding up implementations. These solutions also help to achieve security and performance goals, as well as offer the ability to rapidly scale with predictable performance and costs.

VMware Horizon virtual desktops and applications, combined with infrastructure solutions like Dell EMC’s VxRail or Virtual SAN Ready Nodes, provide the best of all worlds. Users enjoy a great experience on all of their devices, while IT gains simple deployment; centralized monitoring and management; predictable and simple scalability; and optimized costs. You can also leverage innovative technologies, like instant clones, to create a truly stateless desktop model.

If you looked at VDI and virtual applications and desktops in the past and found too much complexity, or high cost, ESG suggests you look again. The infrastructure options VMware offers can deliver a much simpler, more scalable, and predictable VDI deployment, providing a great user experience while enabling IT to achieve its cost objectives.

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