

A Buyer's Guide to Modern Virtualization

Navigating change by modernizing your virtualization strategy for future flexibility, certainty and scale.



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Guide Overview

Uncertain about how changes at VMware and Broadcom will affect your virtualized infrastructure? This guide helps you explore your options as you evaluate your virtualization strategy. Learn about VMware optimization, alternative hypervisors, cloud-managed VMware solutions, and modern virtualization with KubeVirt, so you can modernize—on your terms.

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A Virtualization Strategy to Modernize for the Future

If you're uncertain about the future of your organization's virtualization strategy you're not alone.

"Through 2028, disruptions in the server virtualization market will result in more than 60% of enterprises accelerating their public cloud migrations and exploring revirtualization of virtual workloads" (Gartner® Inc, Predicts 2024: Mind the Gap Between Infrastructure and Infrastructure Platforms, 17 October 2023)¹. The acquisition of VMware by Broadcom has created uncertainty for many IT leaders as they contend with multiple product, pricing, and channel changes all at once. Broadcom has also acknowledged that "while we believe we made changes for innovation, we recognize that this level of change has understandably created some unease among our customers and partners."² Restructuring of licensing models from perpetual to subscription has challenged IT planning and budgeting, and customers are questioning if more changes are coming.³ With this uncertainty, many IT leaders are reconsidering well-established virtualization architectures and practices, and evaluating alternatives to the virtualization architecture they have in place today.

This disruption comes at a time when businesses are under increasing pressure to protect profits amidst global economic turbulence. The price increases, industry accelerated shift from perpetual licensing, and restructuring of contracts make balancing the budget even more challenging for IT.

Beyond this, IT leaders face the challenge of meeting modern workload needs. Innovation driven by generative AI is pushing the boundaries of current infrastructure deployments. AI-based applications and workloads require new and more flexible architecture paradigms including public cloud and containers.

Though these challenges may seem overwhelming, resilient IT leaders will take advantage of this moment of disruption to accelerate their digital transformation and adapt a more flexible application architecture strategy—making the inevitable shift towards a modern hybrid-cloud, hybrid-application development environment. Rethinking the way you architect workloads can optimize infrastructure costs while modernizing and adapting for the future. Saving resources to spend on innovation and services that drive business success, instead of simply keeping the lights on.



Modernization as a Spectrum

While application modernization has been around for the last decade, its focus has been on containers as an end-state. Newer, more nuanced thinking considers modernization not as a destination, but as a spectrum.

It is well known that infrastructure now lives on a hybrid-cloud spectrum where most organizations have workloads spanning across on-premises to the public cloud and in a variety of hybrid variations in between. Architecture modernization can be thought of in much the same way.

While traditionally thought of as an end-state, modernization of application architecture is more appropriately thought of as a hybrid-architecture spectrum. Over time, applications will generally shift towards the right of this spectrum as IT organizations modernize and take advantage of container-based platforms for new application development. At the same time, many workloads and applications are better suited (or required) to stay virtualized on-premises so it is inevitable that most enterprises will have workloads and applications spread across the hybrid cloud/architecture spectrum.

Modernizing on your own terms means being able to manage and deploy workloads across these spectrums with simplicity, ease, and efficiency as you take incremental steps towards modernization that won't disrupt your environment and, ultimately, your business.

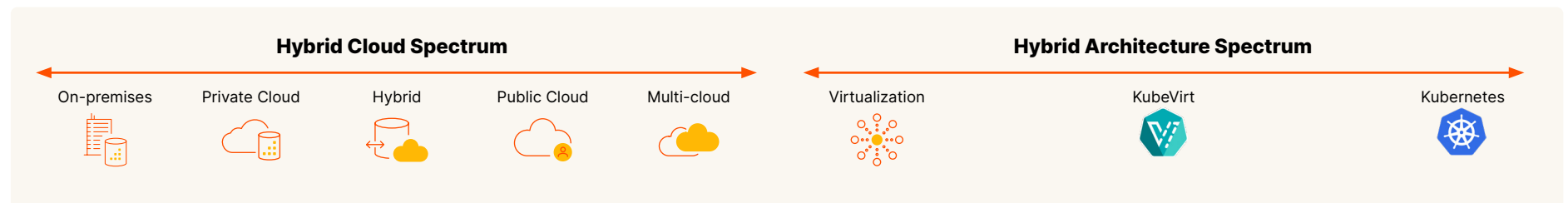
Why Modernize for the Future?

Modernizing for the future will allow you to build infrastructure ready for future flexibility and scale. Most organizations have started to modernize in recent years, but making the move to the public cloud and containers can be costly and complex—especially if you need to refactor applications. Many organizations have decided to keep specific applications on-premises on VMs, and for good reason. However, with the explosive growth of AI/ML workloads, many IT leaders feel a sense of urgency to ensure their systems are more flexible and scalable.

The path towards modernization will look different for every organization and will be shaped by a wide range of factors including:

- Risk tolerance
- Budget
- Resource availability
- Executive buy-in
- Demand from internal and external stakeholders

The path towards modernization will also be unique to each workload and application deployed within an organization. This effort should not be thought of as a “one size fits all,” but rather a range of options, each with its own risks and rewards, pros and cons, strengths and weaknesses.



Four Pathways to Modernize Virtualization

There are four pathways to evaluate when looking to modernize your virtualization workloads:

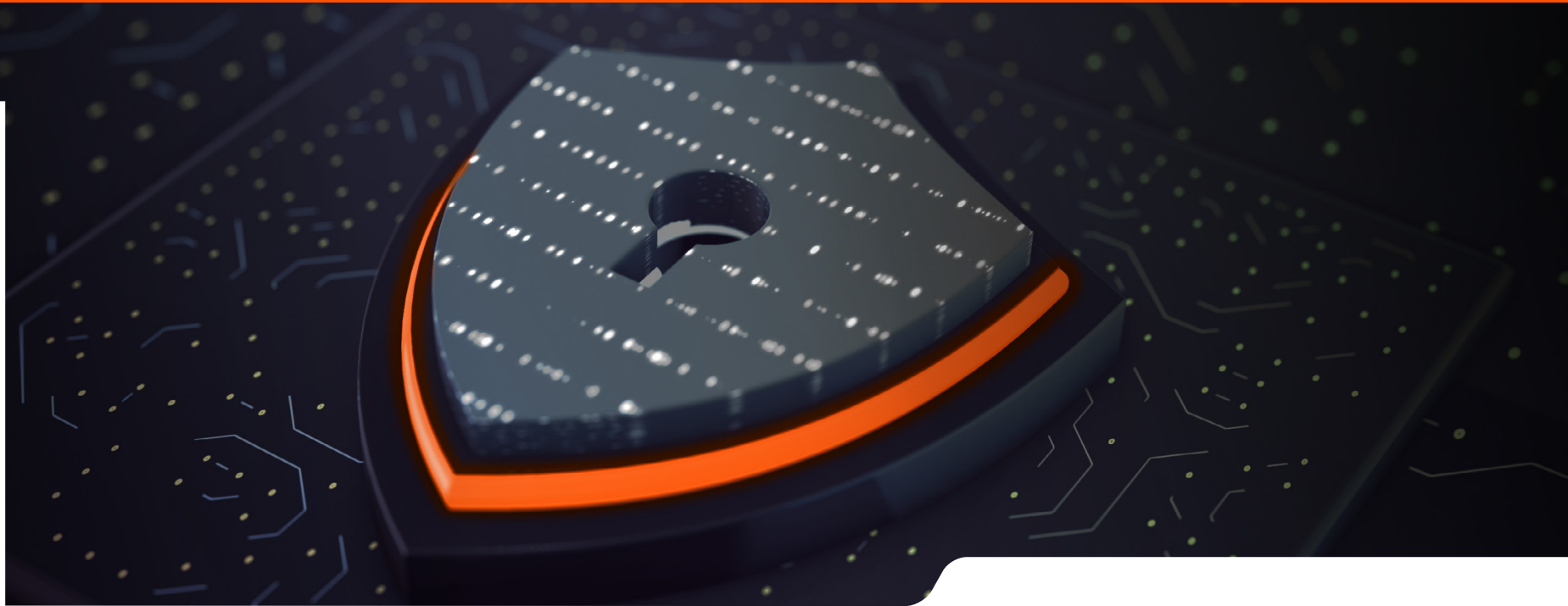
- 1 VMware with Alternative Storage
- 2 Alternative Virtualization Providers
- 3 Cloud-managed VMware
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Each pathway has benefits and drawbacks. It's important to consider the varying levels of risk, benefit, costs and effort of each modernization approach when determining the pathway best suited to each workload and application. We've put together a decision matrix to help guide you in evaluating each pathway.

On the next pages we explore each pathway and how Pure Storage can partner with you across the entire hybrid-cloud, hybrid-architecture spectrum.

	On-Premises Virtualization		Cloud	Modern Apps
Considerations	Pathway 1 VMware with Alternative Storage	Pathway 2 Alternative Virtualization Providers	Pathway 3 Cloud Managed Virtualization	Pathway 4 Modern Virtualization with Containers
Reduced TCO	Improved	Same or higher	Improved in some scenarios	Improved
Risk of Business Disruption	Low	High	Moderate	Moderate
Cost to Switch <small>(e.g. migration, hardware, software, external services, internal skills development, etc.)</small>	Low	High	Moderate	Moderate
Readiness for Modern Applications <small>(e.g. AI/ML, edge applications, etc.)</small>	Same	Same	Improved	Improved
Reduced Risk of Vendor Lock-in	Same	Same	Less	Highly Reduced





VMware with Alternative Storage

One way to insulate your infrastructure from disruption is to diversify layers of your stack.

VMware deployments with vSAN (VMware's storage virtualization software) are often deployed alongside external storage. vSAN is typically included as part of a bundled offer when purchasing a VMware subscription—usually in the range of 100 GiB to 1 TiB per core. Scaling up additional capacity requires the purchase of additional storage. While the license itself may be cost-effective, it does not include the hardware required for the additional storage. If you need to scale capacity beyond what's included,

you may consider adding an external storage partner. You'll not only diversify your stack, but with the right provider you'll gain more efficient, secure storage suited to a wide range of use cases including disaster recovery and data protection. VMware by Broadcom has maintained an open stack to continue to support select external storage solutions.

While this approach doesn't directly move you towards a more modern architecture, it is an incremental step to pave the way for migration of virtualized applications and workloads to the public cloud, alternative hypervisors, or a hybrid VM container option like KubeVirt.



Considerations

Generally, this pathway should be minimally disruptive and have low switching costs. It's likely you may have other storage hardware in your data center and can increase the footprint with minimal switching costs.

To ensure minimal business disruption and optimal TCO, make sure your storage provider takes a cost-effective subscription-first approach to pricing with flexible options that evolve with your business, and that there are options to migrate data non-disruptively from your VMware stack. Ask your storage provider what their options are for migration to the cloud from on-premises arrays, along with integrations with alternative hypervisors and KubeVirt.

Overall, if you partner with a VMware integrated storage provider that provides certainty and predictability in both pricing and upgrades, this pathway can help insulate you from some of the impact from future pricing, packaging and overall business model changes from VMware. And it is an incremental step giving you more flexibility in where and how you deploy your virtualized workloads—making it easier to explore other pathways towards modern virtualization as we'll discuss below.

Consider this Pathway When

- You need to expand storage capacity beyond what's included with your current VMware subscription
- You're coming up for renewal on your contract with VMware

Benefits

- Decreased reliance on a single provider
- Certainty and predictability in budgets
- Better efficiency and cost optimization

[Learn more about Pure Storage with VMware](#)

Where Pure Storage Can Help

The Pure Storage Data Storage Platform delivers block, file and object storage to customers via a flexible subscription model designed to ensure that you are paying for only what you need. You can start with the amount of storage you need to augment your VMware environment and easily expand your subscriptions as needs grow and evolve over time. The Pure Storage subscription pricing model also facilitates cloud migrations and includes entitlements for Pure Cloud Block Store which can be deployed in either Azure or AWS. So you can move workloads from on-premises to public cloud infrastructure if you decide the time is right.



Alternative Virtualization Providers

VMware customers interested in alternative on-premises virtualization platforms can explore options like Hyper-V, Azure Stack HCI, Nutanix AHV, and OpenStack.

Some of these options offer integrations to external storage providers while some are full-stack options and will not reduce risk of vendor-lock. Switching virtualization platforms may come with a high risk of disruption and switching costs.



Considerations

Changes to TCO largely depend on the alternative platform option chosen and whether it is a hypervisor switch (like Hyper-V, AHV) or a full stack solution switch (like Nutanix, OpenStack or Azure Stack HCI). It is unlikely that license costs will decrease with full stack solutions, though there are unique benefits to each platform that should be considered.

Switching virtualization platforms is the most disruptive option as it requires application refactoring and has many downstream dependencies. Switching costs will also likely be prohibitively high for most customers. There are significant migration, dev/test/implementation, application refactoring, retraining and likely external consultant/system integrator costs that all come into play when switching hypervisors.

Switching to a different on-premises alternative hypervisor does little to improve flexibility or agility on the path towards modernization. This pathway offers some protection from future lock-in and potential disruption depending on the path chosen. However, migrating to a full-stack virtualization alternative may just be trading one problem for another.

Consider this Pathway When

- Your organization is exploring a dual-hypervisor strategy or considering moving from VMware to another hypervisor
- You aren't ready to move to the cloud or modernize with a container-based architecture

Benefits

- Decreased reliance on a single architecture paradigm or software provider (depending on alternative chosen)
- Better efficiency and cost optimization (depending on alternative chosen)
- You're coming up for renewal on your contract with VMware

Where Pure Storage Can Help

Pure Storage supports direct integrations with Hyper-V and OpenStack. For these alternative hypervisors, the Pure Storage Data Storage Platform delivers block, file and object storage with a flexible subscription model designed to ensure you are paying for only what you need. You can easily expand subscriptions as your needs grow and evolve over time. Subscriptions also cover cloud storage so you can migrate data to the cloud.

[Learn more about Pure Storage with Hyper-V](#)

[Learn more about Pure Storage with OpenStack](#)



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PATHWAY



Cloud-managed Virtualization

Organizations interested in migrating workloads to the public cloud can take advantage of managed VMware offered as a service in the cloud.

Options like Azure VMware Solution (AVS), Google Cloud VMware Engine (GCVE), and Oracle Cloud VMware Solution (OCVS) all offer the benefit of using the same familiar VMware tools in the cloud, fully managed, which means less IT overhead on infrastructure and no need to purchase or maintain hardware. Most offer lift-and-shift options that do not require refactoring of applications.



Considerations

TCO will not necessarily be reduced from an on-premises VMware deployment to a managed cloud service. Typically, managed services are more expensive than on-premises because they offload the overhead of deploying and managing infrastructure. In some cases, this reduction in overhead may improve TCO.

Migration costs should be considered as part of the TCO. Though most VMware cloud services are intended to provide a lift-and-shift experience, there are always exceptions. Certain on-premises architectures may require some refactoring, or to consider using an additional cloud storage service to minimize disruption.

Moving virtualization workloads to the cloud is an incremental step towards modernization. Once workloads are in the cloud, it can be simpler to refactor to cloud native VMs or container-based architecture than from moving directly from on-premises alone.

Customer pressure has ensured that most cloud providers prioritize portability and integration. Generally, workloads in the cloud will be more portable than workloads on-premises.

Consider this Pathway When

- Workloads would benefit from cloud services
- Your infrastructure strategy includes moving more workloads to the public cloud
- Workloads have rapid scale up needs—disaster recovery workloads in particular are an ideal fit as public cloud resources can scale up quickly based on need

Benefits

- Future flexibility, scale and stability.
- Decreased reliance on a single architecture paradigm or provider
- Meet the needs of AI-based applications and workloads

Where Pure Storage Can Help

[Pure Cloud Block Store™ for Azure VMware Solution](#) provides external block storage for VMware workloads on Azure. VMware workloads that rely on external storage on-premises can be cost-prohibitive to migrate to the public cloud. With Pure Storage for AVS, storage and compute are decoupled, and storage-intensive workloads can be migrated to the cloud in a cost-effective manner.

[Learn more about Pure Cloud Block Store for Azure VMware Solution](#)

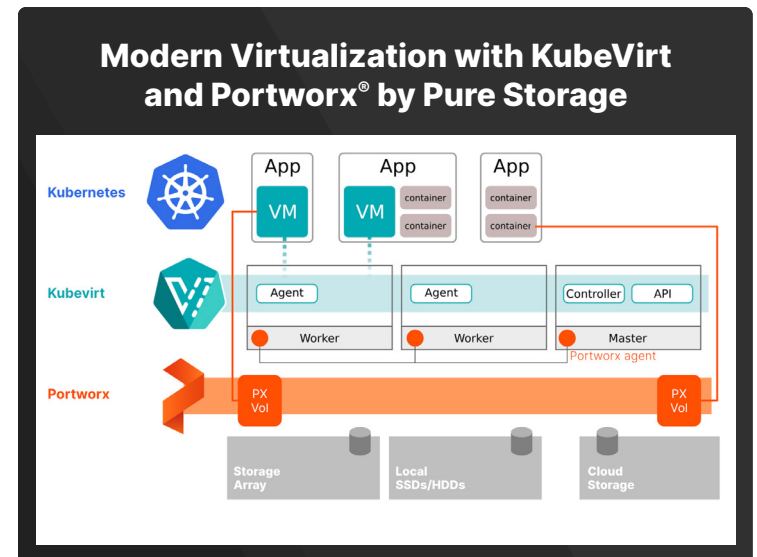


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Modern Virtualization with KubeVirt

While cloud-native development continues to grow, many enterprises still rely on a number of virtual machine or VM-based applications or on databases that must live on top of VMs. Today, these companies are having to spend significant money to maintain both their virtual machine infrastructure alongside their Kubernetes infrastructure.

Red Hat OpenShift Virtualization (OSV), based on the KubeVirt project, addresses this challenge by providing VM infrastructure within Kubernetes clusters. This means that organizations can easily run applications in VMs alongside applications in containers, taking advantage of a common user experience and allowing enterprises to rehost, refactor, redeploy or rebuild applications if and when they are ready as part of their app modernization efforts.



Considerations

If you already have an existing Red Hat OpenShift license, Red Hat OSV is included—so moving to this pathway will not incur any new license costs. While this option removes the immediate refactoring cost, there may be additional long-term costs as you decompose monolithic applications into microservices-based containerized applications.

This pathway opens a way to manage your VMs alongside container-based applications, making it easier and more seamless to move workloads across the hybrid architecture spectrum, while providing your developers with a way to bring modern application development processes and tools to VM-based applications.

It also returns control of applications and data to the organization, decreasing lock-in risk. The underlying architecture of Kubernetes enables enterprises to run on top of any infrastructure—whether on-premises, in the public cloud, or in a heterogeneous multi-cloud, multi-vendor environment.

Consider this Pathway When

- Your goal is to shift to a modern application development platform
- You want to run VMs and containers side-by-side
- You want to streamline operations and development

Benefits

- Future flexibility and scale
- Decreased reliance on a single architecture paradigm or provider
- Meet the performance and scale needs of modern, high performance workloads including AI/ML

Where Pure Storage Can Help

Portworx by Pure Storage automates, protects and unifies data management for applications running in both containers and virtual machines in Red Hat OpenShift. With Portworx, you get a unified storage and data management platform that can support both VMs and containers running on Red Hat OpenShift, or any other Kubernetes platform. So you get the benefits of Kubernetes without having to containerize your long-standing VMware applications. Instead Portworx offers a migration pathway to modern application development by leveraging KubeVirt, while maintaining many of the key storage features VMware admins have come to expect – including, but not limited to, live migration, synchronous DR, and VM backup and restore.

[Learn more about Portworx and Red Hat OpenShift](#)



Self Evaluation Checklist

Assess which modernization pathway is right for your workloads.

Ask Yourself	If Yes...
Are you interested in evaluating alternatives to your current virtualization architecture?	Consider both your short-term and long-term application workload needs, and evaluate the fit of options across the hybrid architecture spectrum.
Do you have workloads that are required to stay on-premises?	Explore options to optimize and diversify your VMware stack with alternative storage solutions.
Does your infrastructure strategy include moving more workloads to the cloud?	Now is the perfect time to take stock of which workloads are suited to cloud deployment. Make sure the migration option you choose can truly lift-and-shift from your on-premises VMware deployment without refactoring.
Does your architecture strategy include moving to more container-based applications?	If you're making changes to your VMware stack, and want to expand your architecture to include container-based applications, now is an ideal moment to choose a few workloads to refactor and move to a hybrid-VM/container solution.
Are you open to considering alternative hypervisors?	Hyper-V and OpenStack are options that integrate with Pure Storage but full-stack options such as Nutanix (AVH+HCI) and Azure Stack HCI as alternatives may still be more expensive than VMware even with increased licensing fees.
Are business disruptions and switching costs a key concern?	Consider pathways that minimize disruption like alternative storage with non-disruptive migration or a true lift-and-shift cloud migration.
Does innovation take precedence over risk at your organization?	Innovation first organizations that can tolerate more potential disruption risk should consider taking the pathway towards modern virtualization with Kubernetes to support bleeding edge technologies.

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2 Hock Tan, "VMware by Broadcom: VMware by Broadcom: the first 100 days" Broadcom Inc., March 14, 2024, <https://www.broadcom.com/blog/vmware-by-broadcom-the-first-100-days>.

3 Steve McDowell, "VMware customers cautious after recent Broadcom actions" Forbes., March 14, 2024, <https://www.forbes.com/sites/stevemcdowell/2023/12/10/vmware-customers-cautious-after-recent-broadcom-actions/>.

