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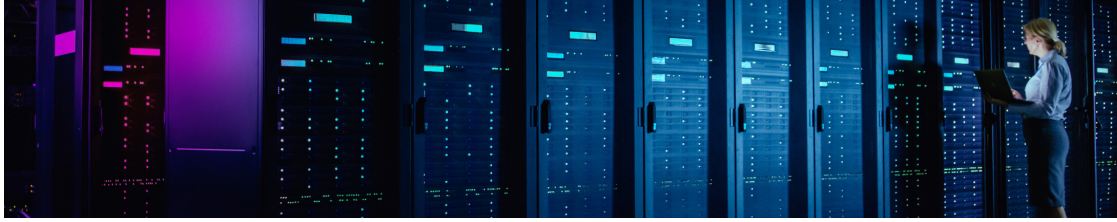
451 Research
Business Impact Brief



The virtues of virtualization

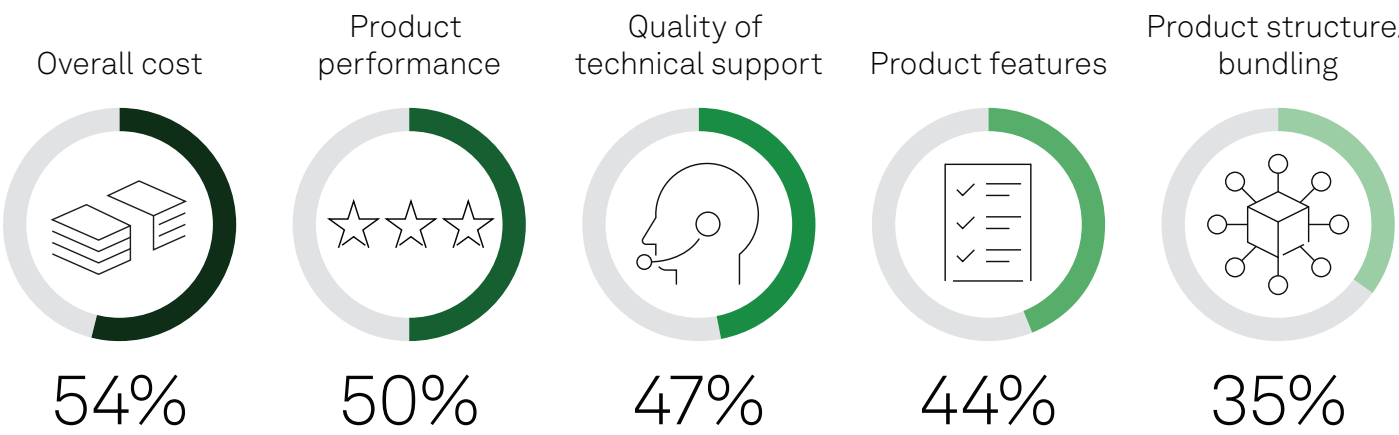
The Take

Virtualization — the ability to pool capacity from multiple physical servers and carve it into individually addressable virtual machines (VMs) — is a foundational technology that has enabled much of modern IT. It was the precursor to cloud-based infrastructure, and it remains prevalent in both on- and off-premises deployments despite the advent of containers, Kubernetes and serverless architectures.

VMs governed by a hypervisor — the software layer that assigns server cores, memory, storage and networking to machine instances — are an embedded technology in enterprise IT, and with good reason. They ensure security by isolating the infrastructure used for different applications, making it possible to mix operating systems and runtimes in a single environment without interdependencies. VMs benefit from a huge installed base of operational knowledge and support from multiple storage, backup, disaster recovery and networking vendors. Many enable live migration of resources between servers without downtime, supporting resiliency for mission-critical applications. And they can help to control costs thanks to higher utilization of existing hardware, lower operational overhead and more efficient management of resources.

According to 451 Research's Voice of the Enterprise: Cloud Native, Server Virtualization/Hypervisor Strategy 2024 survey, IT decision-makers who are satisfied with their primary virtualization solution cite cost and performance as top factors (see figure below). These factors are intimately related: A highly performant platform requires less time to configure and troubleshoot environments, resulting in lower overall cost. Technical support and product features are close secondary considerations driving buyer satisfaction. And indeed, most customers are satisfied: More than half of organizations (57%) report being "very satisfied" with their primary virtualization choice, while 38% are somewhat satisfied; only 6% say they are unsatisfied.

Top 5 reasons for satisfaction with primary virtualization solution



Source: 451 Research's Voice of the Enterprise: Cloud Native, Server Virtualization/Hypervisor Strategy 2024.

The pervasiveness of virtualization comes through in data showing that organizations run VMs across their IT estates, including in private cloud (47%), public cloud (45%), legacy on-premises environments (39%), hybrid cloud (39%), hosted private cloud (33%) and bare metal (21%). In fact, companies often run containers — lightweight software packages that bundle an application and its dependencies into a full runtime environment — in or on VMs to leverage the cost, performance and security benefits of virtualized infrastructure.

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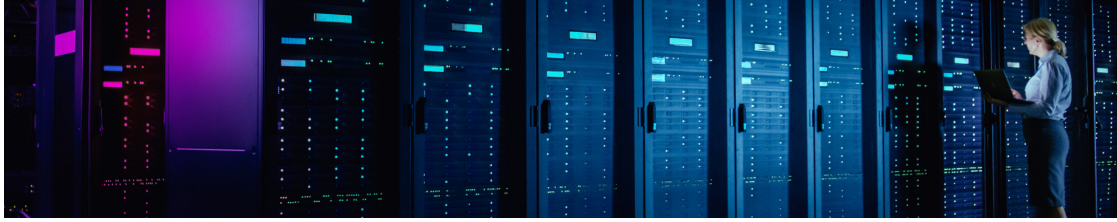

The versatility of virtualization — its ability to abstract compute resources, whether they are deployed on x86 servers, in containers, or on GPUs for emerging AI applications — helps to ensure its staying power as a framework for modern IT. There are clear benefits to having a single operational interface for configuring, managing and patching both VMs and containerized software. Net-new applications can be observed and controlled alongside workhorse legacy software, and modernization using the latest hardware accelerators and software building blocks can happen at a flexible pace.

Business impact

Virtualization enables layers of security. Because virtualization provides intrinsic security benefits, many organizations use VMs to run containers, even though containers can be deployed without a hypervisor. The hardware-level isolation afforded by VMs makes them easier to configure, backup and restore than physical devices, and it also reduces the blast radius should a breach occur. Virtualized environments are ideal for testing and staging applications before pushing them to production, and some platforms offer additional security with encryption, access control and network segmentation.

Having a standard way to provision and interact with diverse infrastructure resources helps address pain points as responsibilities "shift left" into the development process. Application teams are being asked to do more with less as all the "ops" — DevOps, SecOps, AIOps — incorporate guardrails into release pipelines rather than applying them after the fact. With a consistent view of the IT estate, teams can test new features and provision infrastructure in a non-obtrusive way, increasing efficiency and reducing cognitive load.

The role of on-premises and private infrastructure is changing with the AI transition. In the age of AI, many companies are holding their data closer than ever and bringing LLM capabilities to the data, rather than the other way around. This can mean bringing GPUs and other accelerators in-house: In a recent survey of IT decision-makers, 50% of respondents cited AI initiatives as a reason for increased spending on private cloud. Enterprises are exploring ways to organize their data estates and use proprietary information to improve customer experience and release new services. Rapid improvements in model capabilities and the promise of agentic AI, which enables an application to act on a user's behalf, are prompting companies to elevate their data privacy practices. The ability of virtualization to apply stronger security measures to sensitive traffic flows presents an advantage.

Looking ahead

With the coming wave of AI, the power of automation enabled by virtualization means that VMs will play a role as both an enabler of AI use cases and a venue for AI-driven routines. Given the resource-intensive nature of some of these applications, virtualization's functionality gives it staying power as a control plane for diverse and distributed workloads.

Virtualization is not going away anytime soon. As a mature yet adaptable technology, it remains the dominant paradigm for IT infrastructure management, and in some cases, it is the only option. For applications that must remain on-premises due to privacy, governance or latency issues, server virtualization is a viable way to achieve the convenience and flexibility of cloud infrastructure.