



ESG WHITE PAPER

Simplifying Hybrid Clouds, Oracle Brings Public Cloud-compatible Tools and APIs to Customer Premises

Oracle's Private Cloud Appliance Enables Developers to Create and Deploy Cloud-native Applications in On-premises Data Centers that are Compatible with Oracle's Public Cloud

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Executive Overview

Although the widespread enterprise adoption of hybrid cloud computing has delivered multiple benefits, it has suffered the downside of making IT operations even more complex than they already were. The biggest reason for this is that hybrid cloud computing requires IT organizations to develop and run applications across a range of on-premises and public cloud environments that are often distinctly different.

Oracle's latest Private Cloud Appliance (PCA) X9-2 was designed to address this challenge by providing an on-premises environment with many of the same development tools and deployment methodologies that are available in the Oracle Cloud Infrastructure (OCI) public cloud. Applications developed in the OCI public cloud can be easily migrated to run on-premises with the PCA X9-2 or, conversely, developed on-premises and run in OCI as required to suit hybrid cloud computing policies and application needs.

This compatibility between cloud and on-premises environments is not restricted to cloud-native or containerized workloads since the X9-2 also supports a wide range of conventional Oracle and non-Oracle applications and middleware that can also be easily migrated between the appliance and Oracle's public cloud. Furthermore, because the PCA is an engineered system with built-in compute, storage, networking, servers, and control-plane software, it can also be deployed and put into service dramatically faster than equivalent conventional infrastructure. This help to address another major challenge facing IT organizations: the need to enable business innovations by deploying new infrastructure and applications at an ever-increasing speed.

Using Appliances to Accelerate Innovation and Reduce Complexity

In recent years, IT has moved beyond focusing on making businesses more efficient and now plays an even more important role as an enabler of evolutionary and revolutionary business innovation. As the COVID-19 pandemic has demonstrated, leveraging IT to adapt to changes in business environments has become essential to survival while innovating to improve customers' experience of an enterprise's product or services has become the key to growth. The faster and more fully that IT organizations can respond to line-of-business needs, the faster an enterprise can grow its revenue and profits and bolster its reputation.

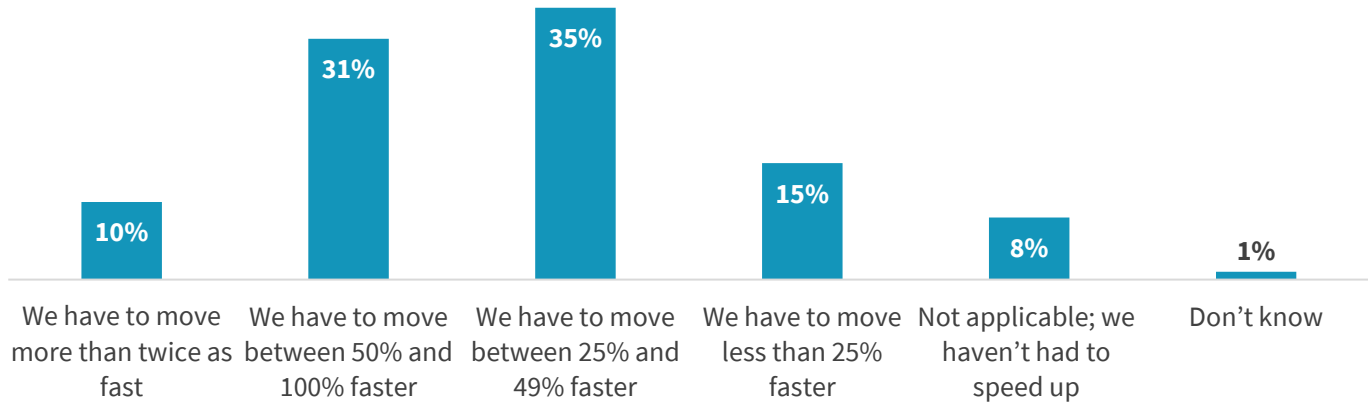
Organizations are keenly aware of these facts, as demonstrated by the substantially increased pressure on IT teams to deliver more capabilities and applications in less time than ever, often with flat or declining budgets. In a recent ESG research study, 41% of enterprise IT organizations said they needed to deploy applications, infrastructure and services at least 50% quicker than they did only three years ago (see Figure 1). 10% of those respondents reported being under even greater pressure as they said they needed to move more than twice as fast as they previously did.¹ Meanwhile, increased IT complexity has made it harder to meet these faster time-to-market goals, with 46% of IT decision makers reporting to ESG that their organization's IT environment is more complex than it was only two years ago.²

¹ Source: ESG Research Report, [Data Infrastructure Trends](#), November 2021.

² Source: ESG Complete Survey Results, [2022 Technology Spending Intentions Survey](#), November 2021.

Figure 1. Application Deployment is Much Faster

When you think of the requirements placed on your organization today compared with three years ago, how much faster, if at all, does your team need to deploy applications, infrastructure, and services? (Percent of respondents, N=359)



Source: ESG, a division of TechTarget, Inc.

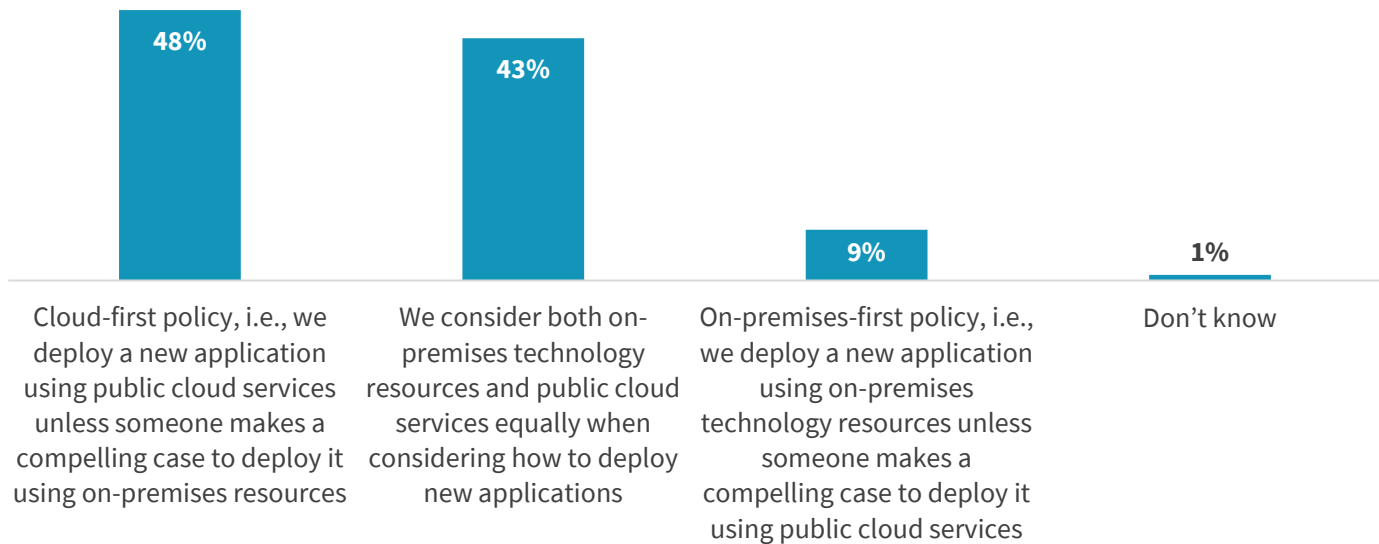
One of the biggest reasons for the increase in IT complexity has been the adoption of cloud computing. According to an ESG research survey, almost half (48%) of IT organizations now have a cloud-first approach for deploying new applications, while another 43% consider both on-premises and public clouds when choosing execution venues for new workloads (see Figure 2).³

As a direct result, IT departments are now forced to deploy and manage applications across a range of public cloud and on-premises locations, each of which is characterized by different requirements, architectures, and capabilities. This is true even for enterprises that have adopted a cloud-first policy, as their application portfolios will include workloads that cannot be run in the public clouds for a variety of reasons that include regulatory compliance and the impact of network latency on performance. The situation is also not static, as the optimum execution venue for applications changes, for example, as businesses rebalance their usage of public clouds or alter that usage in response to changing regulatory environments. This means that applications need to be portable across execution venues.

³ Source: ESG Research Report, [Data Infrastructure Trends](#), November 2021.

Figure 2. Organizations' Approaches to New Application Deployment

Which of the following best describes the approach your organization takes when it comes to new application deployments? (Percent of respondents, N=331)



Source: ESG, a division of TechTarget, Inc.

Complexity is also being driven up by the move to cloud-native and containerized applications, which requires enterprises to manage a mix of conventional and re-factored or containerized applications. A side effect of the increase in complexity is a surge in demand for a range of IT skills that, as a result, are now in short supply and more expensive to hire. The resulting skills gap is forcing enterprises to increase their reliance on IT generalists to manage increasingly complex IT environments, while also demanding that IT departments accelerate the pace of innovation.

The use of converged infrastructure appliances can address these challenges and dramatically reduce the time taken to deploy new infrastructure. The appliances combine compute, network and storage hardware with operating and management software into pre-integrated systems that can be deployed in hours rather than the days or weeks required to implement conventional infrastructure.

However, this is not the only major advantage of such appliances. Optimizing the inner workings of infrastructure elements from multiple vendors requires in-depth knowledge of each subsystem and the way they work together. Most IT generalists do not possess this depth of knowledge. When taking into consideration the impact of sub-optimal configurations and management, converged infrastructure appliances can deliver significantly better cost-performance ratios than infrastructure assembled from disparate elements by IT generalists. Moreover, the provision of a single source of technical support for converged infrastructure appliances helps IT organizations resolve issues in a more timely fashion, providing a major advantage over multi-vendor support models that at best can complicate the resolution of technical problems and at worst can allow vendors to duck their support responsibilities entirely.

Oracle's X9-2 Private Cloud Appliance

Oracle's PCA X9-2 delivers the benefits of converged systems described above, while also addressing the complexity associated with cloud computing. The PCA X9-2 combines compute, network, and storage hardware, deployed via Terraform scripts—also known as “infrastructure as code.” The converged hardware is integrated with operating and management software that allow it to be deployed in less than 72 hours, providing a private cloud and DevOps platform that is optimized for both cloud-native workloads and conventional virtualized applications from Oracle and from third parties. For hybrid cloud computing, the appliance enables simple migration of workloads between itself and OCI. The same Terraform constructs that were used to provision infrastructure on the PCA X9 can be used to provision infrastructure on OCI.

As a private cloud, PCA X9-2 can host both conventional and containerized or microservices applications and middleware. Software can run on a wide variety of virtual machines (VMs) using various flavors of Linux, Windows, and Oracle Solaris. The PCA X9-2's ability to act as a private cloud and provider of self-service infrastructure as a service (IaaS) is enabled by its inclusion of comprehensive cloud management software, including real-time management and modern resource consumption, monitoring and diagnostics tools that can drill down into individual workloads. The same CLI used for OCI can be downloaded and used to manage PCA X9-2 private cloud infrastructure.

Oracle describes the PCA as optimized for IOPS-intensive workloads as well as bandwidth-heavy applications such as big-data analytics, and for real-time environments that require low application-level latency, allowing it to consolidate and replace multiple existing hardware platforms into a single resource.

All applications housed on the PCA can be protected by Oracle Site Guard automated disaster recovery and backup software that is integrated into the appliance. Furthermore, since the appliance's architecture mirrors that of Oracle's OCI data centers, workloads can easily be moved between the PCA and OCI, with the latter offering three fault domains, redundant storage, and network isolation. The use of the same underlying architectures, APIs, and tools on PCA and OCI also makes it easy for customers to migrate workloads back and forth to optimize resource utilization or meet evolving data residency or security requirements.

The PCA X9-2 can also serve as a DevOps platform and an integral element of continuous integration/continuous development (CI/CD) strategies. An integrated Oracle Cloud Native Environment (OCNE) software suite includes a Kubernetes container lifecycle manager, as well as orchestration software and container runtime environments. In keeping with the focus on ease of use and agility, multiple DevOps teams can work in parallel within isolated run-time environments hosted on a single appliance. A Kubernetes cluster can be deployed in only 30 minutes using OCNE.

Not counting spare or reserve hardware, the PCA X9-2 can currently be scaled up to 1,080 processor cores, 18TB DRAM, and over 8 PB of unified storage for block, file, and object access. Oracle's software licensing takes account of partitioning within the system, allowing customers to pay for only the cores they use for specific software. A software-defined 100Gbit spine and leaf network links the elements of the PCA, and the compute nodes are currently powered by third-generation Intel Ice Lake Xeon processors. As newer processors and compute nodes become available, they can be introduced into the same PCA X9-2 rack to expand and modernize the compute capability. The built-in storage is Oracle's ZS9 ZFS dual-controller system, powered by flash write-accelerators and disk, and the PCA can also be attached to external Oracle or third-party storage systems.

The Bigger Truth

Cloud computing can reduce costs by improving resource utilization. Even more importantly, it increases IT agility by providing application owners with a self-service facility that allows them to deploy applications rapidly whilst sparing them the complexities of deploying and maintaining the underlying infrastructure.

But the huge majority of enterprises cannot or do not want all of their applications to run solely in public clouds. For these organizations, the use of converged infrastructure is a way to achieve many of the same operational benefits of cloud computing while continuing to host workloads in their own data centers or co-location facilities. Converged infrastructure appliances do not fully eliminate the need to deploy and maintain infrastructure, but they significantly reduce the complexity of the task and increase IT agility by hugely accelerating the deployment of new infrastructure. Similarly, the use of converged infrastructure appliances allows IT organizations to devote more of their resources to the innovation that businesses demand for their survival and growth.

For companies wanting to run workloads on cloud-like infrastructure in their data centers, there aren't many options available. In addition to Oracle PCA X9-2, there are on-premises offerings from other major suppliers that are aimed at organizations with long-term commitments to on-premises hardware—especially companies that are not looking to quickly move to the public cloud. These platforms provide dashboards that emulate cloud as-a-service capabilities and implement usage-based billing for traditional on-premises hardware that may end up costing more than if customers had simply purchased the hardware. In addition, these platforms may lack equivalent public cloud infrastructure and services, creating major impediments for organizations that want to maintain on-premises and cloud compatibility. Organizations that want an efficient, cloud native on-premises development and deployment model that is public cloud-compatible could find PCA X9-2 better suited to their needs.

The advantages of Oracle's PCA X9-2 extend beyond the general benefits of converged infrastructure by replicating key elements of the OCI architecture and operating environment, making it easy to move workloads between the appliance and Oracle's public cloud. For users of OCI, that should put the Oracle PCA at the top of a candidate list for converged infrastructure appliances. The same holds true for organizations looking for an optimal location for running Oracle enterprise applications and middleware since PCA is also optimized for those workloads and provides deployment-ready VM templates and custom images for them. However, the PCA X9-2 is far from a platform only for Oracle applications, and OCI is far from a cloud service only for Oracle workloads. Both support a wide range of non-Oracle applications and Oracle applications. For this reason, ESG believes the PCA should be evaluated by all enterprises as a means of accelerating infrastructure deployment and boosting IT agility.

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