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Modern Virtualization & Hybrid Cloud Migration

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## What's the real story?

Starting in the early 2000s, organizations have optimized compute resources by migrating dedicated server configurations to virtualized solutions that take advantage of an entire data center. This shift, while entailing initial capital expenditure, has led to substantial long-term savings and reduced reliance on a widespread physical presence.

Virtualization changed the way data centers once used physical hardware. These tools allow higher capacity utilization of hardware while reducing cost by enabling multiple "virtual" machines to run on a single host securely and efficiently. Challenges remain for how organizations maintain their IT infrastructure, including but not limited to, the cost of the hardware, power, cooling, and vendor support contracts.

Today, virtualization in on-premise data centers is commonplace, with the proliferation of various technologies that drive a diverse set of technical capabilities. Many agencies now grapple with mounting technical debt as virtualization hardware nears end-of-life and new platforms emerge, necessitating a reevaluation of IT budgets and future strategies:

- **Scalability** Virtualized environments can be scaled up or down based on evolving resources
- **High Availability** enables organizations to capture real-time snapshots of a virtual environment, allowing for rapid restoration and redundancy
- **Reduces physical footprint** decreases energy consumption costs for power and cooling requirements; smaller footprint, bigger impact
- **Flexibility** easier and faster to deploy environments with various servers, desktops, and applications (e.g., Unix, Windows, User Desktops)

## What are ongoing challenges?

As existing virtualization technologies become legacy, organizations are starting to pivot to both newer technologies and new hosting models. Before choosing to migrate to a modern platform, or deciding on a cloud provider, IT Leadership should be asking: What are the trade-offs between cost and efficiencies? How will mission applications directly benefit from the new strategy? How will my agency remain compliant with data and cyber security requirements while reducing costs?

Delivering enough capacity in the event of a failure and outage also meant that there was a need to "over buy" on infrastructure when load was high. This resulted in wasted resources when compute needs no longer warranted increased capacity. By moving to a FedRAMP-approved cloud provider such as AWS, Google, or Oracle, many of these challenges are now mitigated through scalability, elasticity, enhanced security, compliance, backup and recovery, reduced hardware maintenance burden and cost optimization through the shared-responsibility model.

- On-premise computing brings higher costs of ownership and inherent limitations. These infrastructure requirements necessitate considerable investments such as hardware, ongoing maintenance and a dedicated IT support team. Automation and integration with public cloud services is now an effective alternative. Virtualization allows for the creation of easily scalable and manageable virtual resources and environments. This level of flexibility and portability enables enterprises to meet evolving demands and deliver future-ready solutions.
- A hybrid infrastructure model offers advantages through incremental migration and use of current on-premise investments. The integration of cloud and on-premise resources allows organizations to immediately take advantage of scalability, adaptability, and agility while maintaining full control over data and workloads. While this hybrid model seems more expensive on its face than utilizing only a public cloud provider, it can offer many advantages, including cost saving in some cases (e.g., power, cooling).

Virtualization and containerization facilitate seamless integration with public cloud services, offering a hybrid infrastructure that combines on-premise and cloud benefits. This approach empowers enterprises with on-demand resource scaling and access to robust cloud capabilities.

## Where can you make improvements?

Transitioning to a cloud environment requires careful planning. Organizations should consider developing a roadmap for their IT operations footprint over the next five years. In cases where a complete shift to the cloud is impractical, a strategic hybrid solution should be devised. No matter the trajectory your organization will take, preparation for the next generation can, and should start now. Organizations should consider the following best practices:

• **Containerization:** This involves building self-sufficient software packages (i.e., containers) that perform consistently, regardless of the hardware they run on. Kubernetes has become a key resource to prepare organizations for a platform-agnostic future, allowing application delivery from any host, minimizing downtime, and preventing siloed infrastructure. Organizations should begin containerizing on-premise now, easing a seamless cloud migration in the future.

#### Automated resource deployment: Whether it's autoprovisioning servers, backing up data, or streamlining unused processes – these are just some of the tasks that can be achieved without error prone manual efforts. Terraform is one of the standards for automating deployments in Multi-Cloud, Multi-Platform environments. A fully optimized Terraform platform mitigates risk of human error due to manual image and deployment solutions, while freeing up staff to focus on more high-value activities.

### How can you get started?

Organizations can further optimize compute resources and significantly reduce costs by migrating server configurations to virtualized solutions. To develop a virtualization strategy, we suggest beginning with these four steps:

- 1. Assess Needs: Evaluate organizational requirements and goals for virtualization, considering scalability, efficiency, and cost savings.
- 2. Choose Platform: Select a suitable virtualization platform like VMware or Hyper-V based on compatibility, features, and budget.
- 3. Migration Plan: Develop a phased migration plan to transition critical systems to virtual machines, prioritizing key applications.
- 4. Security and Training: Implement robust security measures for virtualized environments and provide training for IT staff on managing and securing virtual infrastructure.

Deloitte's Core Technology Operations helps agencies answer critical questions on virtualization. Contact us today for more information.



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