

Testing and Validation Best Practices for IT Infrastructure Consolidation and Migration

Ensuring a successful government storage consolidation project with storage performance validation

Introduction

Consolidation and migration projects are typically initiated to lower IT costs and improve overall IT operational efficiency. The Federal Data Center Optimization Initiative (DCOI) was kicked off in a 2016 memo to federal CIOs. The focus of the DCOI initiative is to: establish and publish cost savings and optimization improvements, provide public updates on cumulative cost savings and optimization improvements, and review agencies' data center inventories and the implementation of data center management strategies.

This memorandum defines a framework for achieving the data center consolidation and optimization requirements of FITARA, the criteria for successful agency data center strategies, and the metrics OMB OFCIO will use to evaluate the success of those strategies.

The trend to data center cost savings and optimization improvement has been enabled by both server consolidation and storage consolidation, often requiring extensive migration work. Although consolidation of servers and storage can substantially increase the efficient use of resources, it may also result in complex configurations of data, networks, applications, and virtual servers that need to support highly unpredictable application workloads. Risk is usually increased, especially when it comes to performance.

Further, the changing mix of applications and evolving data management requirements are driving major change in storage requirements.

Federal government IT managers are demanding infrastructure solutions that allow them to deploy complementary tiers of networked storage systems and compute layers, including cloud approaches, optimized to meet specific requirements for performance, capacity, reliability, and cost. Consolidating older, expensive storage systems into newer, more cost-effective lower tiered storage is another strategy often employed in consolidation projects.

Challenges

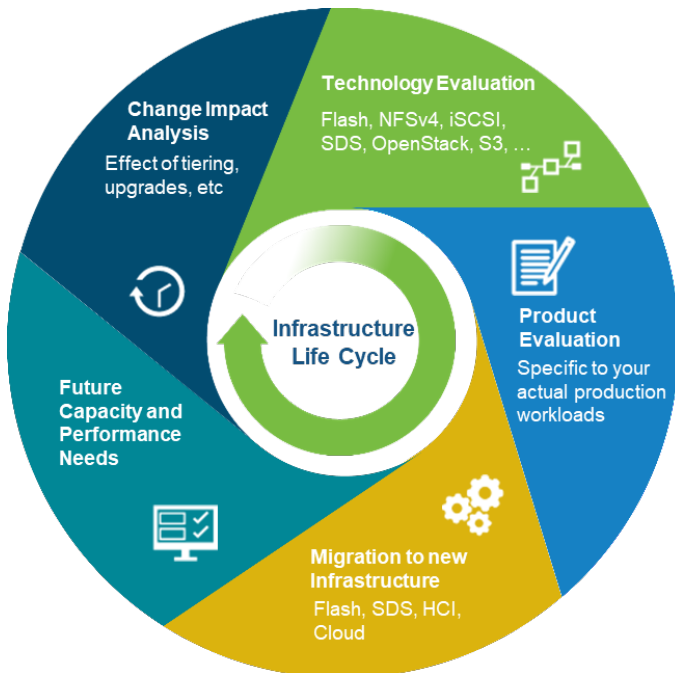
Accurately sizing all infrastructure components in the consolidated data center has been more of an art than a science. Understanding the performance and workload characteristics of virtualized applications is difficult to assess, often leading to major performance issues occurring at peak times due to contention between the infrastructure resources.

Consolidated infrastructure inevitably includes new network infrastructures to support the greater I/O demands. While these networks are potentially beneficial from a performance perspective, transitioning to higher speeds creates real challenges for federal IT architects in balancing performance with cost.

How Virtual Instruments Test and Validation Solutions can help with infrastructure consolidation / migration

Virtual Instruments Load DynamiX Enterprise is uniquely positioned to properly test and validate consolidated storage platforms with a high degree

of accuracy. Virtual Instruments provides a combined software and hardware solution for workload characterization, workload analysis, workload modeling and performance validation. The product suite empowers IT organizations to mitigate performance risk with consolidation initiatives. With the ability to accurately emulate real-world application workload behavior, Virtual Instruments enables IT infrastructure engineers and architects to understand their workload I/O profiles and make intelligent sizing and deployment decisions.



Virtual Instruments can help you with:

- Intelligently evaluating or buying new infrastructure technologies and products
- Migrating workloads to new infrastructure whether its Flash, SDS, HCI or Cloud
- Consolidating & migrating workloads on existing infrastructure
- Evaluating future capacity and performance needs
- Analyzing the impact of changes on performance

Our recommended best practices include:

Performance Testing Best Practice

Virtual Instruments enables storage engineers and architects to compare storage system performance using not just an arbitrary industry benchmark, but

accurate workload simulations that realistically resemble their production environments. The tests are easily and fully (100%) repeatable over time, so accurate “apples to apples” comparisons can be done across vendors and time.

Virtual Instruments develops a workload model that allows you to accurately simulate how well the proposed applications will perform when run on a consolidated system -- at the “worst case” scale you expect to see in production -- with the network protocol you are moving to. There is no need to rely on vendor claims, best guesses, or Do-It-Yourself benchmarking tools that simply don’t represent your environment.

Tiering and Configuration Optimization Best Practice

What is the right mix of HDDs vs. SSDs in your data center? How do you determine if traditional hard drive-based storage is most appropriate for your workloads versus hybrids or all flash arrays? With the flurry of new technologies (SSDs, object storage, caching/tiering, dedupe/compression) promising faster, cheaper and better storage solutions, it’s hard not to get caught up in the hype. And how can vendors make such claims about their technology without knowing how the technology will perform in your specific environment with your consolidated workloads?

With Virtual Instruments, you determine the optimal storage price / performance configuration by varying dozens of settings like read/write ratio, random/sequential ratio, number of clients, block/file size, compression / dedupe and queue depth. And on the array, vary media type, caching, and other variables, such as the effect of replication and backup. With Virtual Instruments, you will know your optimal configuration and available headroom before you consolidate. You can determine the optimal number of consolidated workloads that the new centralized storage system can adequately support - without over-provisioning or under-provisioning the storage infrastructure.

Pre-production Validation Best Practice

The process of validating storage configurations just prior to production cutover has become much more challenging with the increase in storage scale, complexity, and advanced technologies such as virtualization. Testing and validating storage infrastructure can be extremely complex, often involving hundreds (or more) of interconnected servers, as well as switches and storage arrays. The risk of new deployments missing key SLAs is increasing as the complexity and scale of the storage infrastructure grows. Beyond just the

components, validating storage infrastructure requires tracking thousands of access paths in real time. In a SAN with only a few dozen servers, tens of thousands of paths must be validated to ensure performance.

Virtual Instruments automates the development of workload models that allow you to accurately simulate how well the target storage systems will perform in your data center based on a variety of real-world testing scenarios, prior to going live. You enable faster deployments with much less risk.

Cloud Migration Best Practice

The Cloud Migration Best Practice uses agents to capture and replay workloads at the compute operating system level, for both Windows and Linux environments. This allows you to:

- Compare compute, storage and network performance across different availability zones
- Compare price and performance across different cloud providers
- Compare private and public cloud options for both price and performance

Virtual Instruments provides a comprehensive report of the findings and pricing comparison across vendors against the application workload needs.

Summary

Proactive, pre-deployment testing enables higher consolidation rates without impacting performance as demands change. It eliminates the risk associated with consolidation by enabling delivery of and adherence to SLAs and the DCOI. Changes in demand and performance can now be detected long before users are impacted. With Virtual Instruments' "what if" performance modeling capabilities, government storage architects and contractors can provide extremely accurate performance forecasts by using actual real-time or historical data and applying configuration changes to that data. Running reports that show latency and throughput enable the comparison and recommendation of other options that balance utilization and result in faster and less risky consolidation.

The benefits of consolidation are well understood and Virtual Instruments can accelerate and de-risk your consolidation / migration initiative by providing best practices around storage consolidation with an advanced performance testing and validation solution.



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