Why Dependency Mapping is Critical for the Modern Data Center
The last decade has seen a profound shift in the way IT is delivered and consumed by organizations, triggered by new technologies and the emergence of the data center as a service hub for business transformation. It began with the virtualization wave that swept through the IT industry from 2001, starting out as an IT tactic for server consolidation but gradually becoming strategic as the decade neared its end.

In 2015, converged infrastructure, cloud platforms and web-scale architecture are all enabled by virtualization. Run out of service-centric data centers, they facilitate application and service elasticity that give businesses a new agility. The long-standing mission to align IT with business strategy for true business transformation – the Holy Grail of Chief Information Officers – has become achievable.

There are, however, obstacles to alignment and transformation. With the new found agility comes complexity. Greater elasticity is achieved by decoupling application execution from physical servers, which means there are more configurable elements and therefore greater configuration challenges. This creates a problem for IT operations and vendor management groups who depend on being able to see through the complexities for a better understanding of how the estate is working and how it can be optimized. There are gaps where they used to see clear relationships and dependencies.

For organizations to realize the benefits that more agile and elastic infrastructure can deliver, they must be able to map the relationships and dependencies across multi-tier and multi-site environments. Without a strategy and discovery methodology to collect and analyze this information, IT optimization becomes difficult and true business transformation impossible.

**THE PAST: GROWING COMPLEXITY**

In 1999, VMware launched the first commercially available virtualization platform, followed in 2001 by the first x86 server product. A trickle of innovation turned into a cascade of new products when other vendors entered the market – Citrix and Microsoft chief among them – and virtualization was soon transforming the data center. By 2007, most forward-thinking organizations were starting to make the move from physical to virtual. At first it was a consolidation exercise to save money, but gradually it was seen as a way of supporting the business with more effective infrastructure.
By introducing virtualization technologies and decoupling the physical infrastructure from applications, IT groups could define logical units of compute, storage and network services, then manage them more effectively. They could ensure applications were available with the performance and transaction guarantees that were needed, when they were needed.

Rather than have to deploy compute power in the traditional way, where a physical server was designed to support the peak load condition of an application, a combination of virtual servers, storage and network resources were modeled to support variability in resource demands across a cluster of services.

A pool of resources could be accessed by applications when required, used for as long as they were needed, then made available to another application when the peak time passed. Virtualization vendors provided tools to manage the consolidated estate, balancing transaction loads based on capacity planning and demand, enabling IT operations to “do more with less”. Servers and storage were consolidated, while compute performance was significantly increased.

As “standards” abstracted physical interfaces, Services interfaces are being defined and adopted to support Cloud Services

CONVERGED INFRASTRUCTURE AND ELASTICITY

As the technology made it easier to spin up new servers and launch new services, “virtualization sprawl” became a data center management challenge. A step change came around 2010 with “converged infrastructure”, a term HP coined for a single pool of integrated hardware – compute, storage and the network – that could be self-provisioned and pre-configured through a single pane of glass.

Next came the widespread adoption of cloud architecture, where automated infrastructure provisioning combines with scalable application components to enable the elasticity that is a key component of cloud. The infrastructure hardware is hidden in the background as open APIs are used to expose multiple services. More flexibility for sure, but even more complexity when it came to relationship mapping.
As virtualized infrastructure evolved and cloud platforms flourished, data centers became heterogeneous environments, with a mix of virtualization platforms, operating systems and networks. It had also become evident that the future was hybrid, with organizations taking different services from different providers and data centers.

The service elasticity that enables on-demand access to a shared pool of configurable resources spans public and private clouds as well as on-premise estates. Application and infrastructure services are now configured and moved between them, depending on the performance, availability and management service requirements. This “velocity of services” cuts costs, but adds further management and compliance complexity.

**THE PRESENT: NEW CHALLENGES**

The evolution of the data center was a boost to IT operations. Responsible for delivering IT back to the business as a service, their focus is on cost and performance, two metrics that were boosted by converged infrastructure, virtualization and consolidation. The ongoing pursuit of higher performance from fewer resources was also driven by innovation around multi-core CPUs. Used in clusters and combined with physical and virtual servers, the efficiency benefits are tangible, but with so many more configurable elements come greater configuration challenges.

**PRESSURES ON SOFTWARE ASSET MANAGEMENT**

When it comes to vendor license fees and Software Asset Management (SAM), the new complexity can lead to unexpected costs. Software vendors responded to changes in enterprise technology with increasingly complex licensing metrics and different rules for different implementations. The upshot is that the way IT managers implement virtualized services has a direct impact on what they end up paying vendors in license fees.

A software instance may be multiplied hundreds or even thousand of times in a multi-tier web scale environment, and unless the relationships and dependencies are fully understood and compliant with license requirements, an organization leaves itself exposed to software audits that result in heavy fines. Alternatively, it may unwittingly pay for licenses that it doesn’t need. Either way, there are substantial cost benefits in having better visibility of virtualized estates.

**BARRIERS TO ONGOING IT OPTIMIZATION**

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While converged infrastructure was a move away from the silos of old and delivered a new agility, software relationships and dependencies became increasingly difficult to map. Complex virtualized deployments that typically involve soft partitioning, hard partitioning, clustering or hyper-threading, make it harder to ascertain how applications are utilizing the underlying infrastructure.
Decoupling the application layer from the infrastructure layer has created a “Whitespace Gap” where traditional management and monitoring tools draw a blank. Software licensing tools were built for the relatively straightforward world of desktop environments and are ill-equipped for discovery in virtualized, multi-tiered data centers. BSM solutions provide a “services-down” into-the-infrastructure view that make up a single instance, taking an entry point from where the user accesses the application. They will drill down and find dependencies specific to that application but organizations also need the “infrastructure-up” view.

Traditional SAM and operations management tools can’t manage what they can’t see. They are locked in silos and unable to provide a consolidated view of converged infrastructure. They will provide the singular, individual elements but they don’t have the intelligence to build up the underlying, multi-level relationships and dependencies to see how applications are utilizing the underlying infrastructure. This is important for license compliance and IT consolidation.

To make SAM an effective process in complex data centers, or enable IT operations to continue to optimize a virtualized estate, you have to be able to identify separate components and then provide the connection points and the relationships that determine how they are configured. It has to be mapped out through an infrastructure-up approach, moving from infrastructure, through applications to the service layer. The goal is a holistic view of the entire IT estate.

Surveys repeatedly show that around 70 percent of data center budgets and personnel are focused on maintenance with only 30 percent allocated to business objectives. Part of the problem is staying on top of the new complexity. To keep it optimized, organizations need to close the Whitespace Gap and gain visibility of every relationship and dependency in the data center.
COLLECT, INTEGRATE, OPTIMIZE

A three-step methodology – Collect, Integrate, Optimize (CIO) – provides a structured approach to seeing through data center complexity. Working from the infrastructure up, discovery and mapping tools source the data that will eventually inform the strategy, whether it’s asset management for saving money, or IT optimization that prepares the path for business transformation.

COLLECT

First you have to establish a formalized, maintainable and documented process for collecting the key metrics necessary for use in operational analysis. This is a discovery process that maps dependencies across virtualized relationships and configurable elements, identifying what versions are installed and what’s actually in use.

The ability to carry out a comprehensive scan of a heterogeneous environment is essential – remember that most organizations are moving to hybrid models – collecting data from different platforms (physical and virtual), operating systems and networks. This forms the basis of everything that follows, and has to be executed quickly and accurately because data centers are constantly changing.

INTEGRATE

The second stage is integrating raw data with existing operational tools and license management metrics. Extensibility is important for sharing the data, for loading it seamlessly in the correct and expected format, without compromising its integrity and accuracy.

Collated data that represents the configurable elements and virtual relationships across an entire estate is now ready to be interrogated and analyzed. It can be made available for particular reports or exported to specific repositories for further “slicing and dicing”, using CMDB (Configuration Management Database) applications and SAM solutions via database queries or CSV, XML etc.

OPTIMIZE

With the data mapped and dependencies laid bare in operational systems, the “White Space” gap is closed. The organization has moved from being reactive to proactive, enabling different stakeholders – operations, procurement, software asset management – to build financial models that will optimize the IT estate and align IT to their business objectives.

With clear visibility of where things are and the relationships between them, it’s time for predictive analytics, the “what if” scenarios and trend spotting that help build a future-proof organization.

Dependency mapping becomes a continuous process that facilitates ongoing IT transformation.
NEW DISCOVERY TOOLS

The last decade has seen the emergence of a new world of IT with the data center as the hub for delivering IT services back to the business, leveraging converged infrastructure, cloud platforms and web-scale architecture. This new world is complex and demands new types of discovery tools to keep it optimized and able to deliver on its promise. The existing tools won’t work out of the box and demand customization to fill the gap. This drives up costs, distracts the IT team from their core responsibilities and undermines the benefits of the new agility.

Seeing through the complexity in the data center, to better leverage the advantages while mitigating the risks, becomes business critical for large corporations that increasingly see IT as key to competitive advantage. They need solutions that are as open and agile as the systems and platforms they seek to map. They want to be able to query accurate data for the best ways to optimize cost, performance and support, leading to true business transformation.

PRODUCTIZING THE PROCESS

Organizations need to have processes in place for managing this new world of IT. With the step change in both the complexity and rate of configuration, brought about by the adoption of virtualization and converged infrastructures, iQuate has found a new demand for its unique capabilities in data center discovery and dependency mapping.

As virtualization continues to drive adoption of new cloud services, and as software deployments in the data center are becoming more elastic and complex, organizations must use configurable elements to define and manage the environments more effectively. To do this, they must first identify their relationships and dependencies.

With an infrastructure-up approach, tied to agentless technology, iQuate has successfully turned the CIO (Collect, Integrate, Optimize) process into a product – iQSonar. Comprised of a scan engine for discovery and mapping, a central repository for cleansing, categorizing and normalizing the data, and tools for visualization, it delivers operational metadata that can be used for IT transformation, configuration management and license compliance.

CONCLUSION
iQSonar is built from the ground up to integrate with third party solutions, because iQuate recognizes that integration with third-party solutions will put its data to the best possible use, facilitating multiple use cases across operations management, procurement and SAM.

Through an API framework and built-in connectors, iQSonar provides seamless integration with operations management software and license tools from other vendors, allowing organizations to leverage existing investments and extend their capabilities. The unique scope of iQSonar’s discovery and dependency mapping encompasses multi-platform Unix and Windows assets, from leading vendors including Oracle, VMware, Microsoft, IBM and Citrix.

The endgame is unprecedented insight into the data center, fuelling more informed decision-making that moves an organization further along the optimization path to full-blown business transformation.