Executive Insight
Business Fit Assessment

FREEFORM DYNAMICS

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Planning your journey to modern apps and Hybrid IT

Platform choices remain important

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Virtual machines were just the start

The virtual machine – and indeed virtualization generally – has become 'part of the furniture' of enterprise IT infrastructure. In many ways, it's the sort of thing you forget about until it breaks, or until you run out of physical resources.

VMware and its vSphere platform made this kind of infrastructure thinking even easier, for example with tools such as vMotion, which allowed you to treat the hardware as a resource pool and move VMs between servers. The result is that many organizations have accumulated a variety of vSphere hardware hosts – of varying ages and architectures – over the years.

However, the demands on enterprise IT infrastructure have not stopped expanding. As well as the constantly growing demand for VM hosting, we see huge interest in newer hybrid concepts and technologies. As well as containerization and microservices (sometimes referred to as 'serverless'), these include VDI (virtual desktop infrastructure), which remotely manages and delivers virtualized PCs.

VMware has responded by making vSphere more capable than ever before, most recently by adding native Kubernetes support. However, this presents the vSphere-using organization with an even bigger task: not only will you be looking for more server capacity, but in order to keep up with demand you also need simpler management, and of course more automation across the board.

In this paper we will look at what's driving this need, and at some of the key strategic opportunities it presents. We will also look at how the platforms have evolved, and in particular at how converged infrastructure (CI) has joined with the rapid development and uptake of software-defined technologies to offer notable advantages over modular one-size-fits-all platforms such as traditional hyper-converged infrastructure (HCI). Lastly, we will examine an example of a real-life solution, to get an idea of how all of the above can translate into practical business reality.

Containers and the move to hybrid IT

For most organizations, there is an inclination to focus on 'future of IT' concepts, such as containers, microservices, VDI and hybrid cloud, when implementing new systems and infrastructure. However, while these technologies might be ideal for new services, your organization still has existing core business applications that it relies on today – and will rely on for some time to come – and they could benefit from new systems and infrastructure too.

Those core applications have probably been virtualized over time on an ad-hoc basis. They could now be re-architected, but that takes time and may be disruptive and costly. Instead, they could be moved to a cloud platform, but again that can be disruptive and costly, and in any case the cloud model will not suit all needs or all business cases.

One thing we can be reasonably certain of, therefore, is that the future is hybrid – not merely Hybrid Cloud, but Hybrid IT. That is, different platforms, services and delivery models all operating and accessible side-by-side, regardless of their actual locations,

and ideally all sharing data, resources and of course users. Hybrid IT is what should be driving data center modernization.

Renewing vSphere

VMware's response to this demand for an increasingly hybrid enterprise IT infrastructure has been to redesign vSphere from version 7 onwards to add support for several key advanced technologies. Most crucially, it has added native support for building, running and managing Kubernetes applications via a comprehensive services framework called VMware Tanzu. Another notable addition is the ability to pool and share hardware resources across VMs, such as GPUs for AI/ML acceleration.

Much of this new technology is based on acquisitions, for example Pivotal for its Kubernetes platform, integrated into vSphere as Project Pacific. Other relevant VMware acquisitions include Bitnami for its Kubernetes packaging technology, integrated into vSphere as Project Galleon, and Bitfusion for its GPU sharing capabilities.

Adding yet more to the mix

Understand too that, as you move into the 'as-a-Service' world of containers, serverless and so on for your next generation of systems and services, this does not remove the need for virtualization – quite the reverse in fact. This is because many container-based platforms actually run on top of a virtualization platform such as vSphere. So just as the mainframe never went away despite the many predictions of doom, neither will the ongoing need for virtualization platforms.

The question therefore is, given that virtualization platforms are almost certainly going to remain a big part of our IT landscape, how do we avoid the pain and costs of maintaining older hardware and software platforms? And how well will our long-lived VMs fit in with our new IT platforms and services going forward? To what extent can we consolidate the old and the new?

The task, then, is to find a modernization and consolidation route that is inclusive. In other words, it should ideally support both your current and future VMs, and also new and re-architected services running in containers or as microservices as part of an evolution to a broader hybrid IT infrastructure.

Making a business case for modernization

We tend to think of virtualization as mature and 'settled', but a lot has changed since it broke through into the mainstream. Server and storage technology has evolved considerably of course, but so has the associated software. In particular, system monitoring and management capabilities have been greatly enhanced, simplified and automated, for example to provide visibility into which processes or services negatively impact others by their excessive consumption of resources (noisy neighbors).

And perhaps most importantly of all, remember that with vSphere (or any other virtualization platform), the very nature of the VM means that you can abstract infrastructure decisions, such as consolidation, from service decisions. Yes, you might need to rebuild your core applications in the future, but that can be done when time

and resources permit. For now, the key thing is to get them onto a stable, modern footing.

By 'modern' in this context, we refer not only to the hardware and software, but also to the management and monitoring capabilities mentioned above. In particular, that's the triad of control, automation and visibility. Each of these is essential, but prioritizing one over the other two will tend to tilt the resulting platform out of balance and thereby fail to deliver the full benefits (Figure 1).

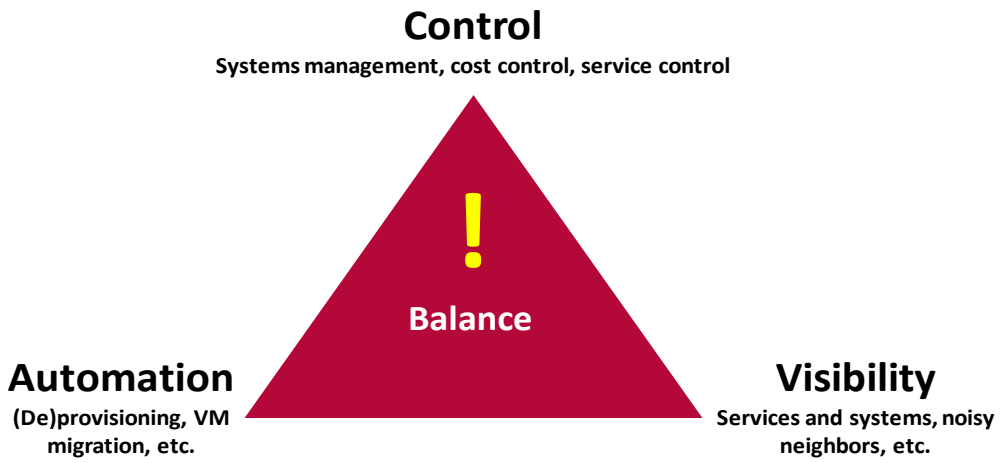

Figure 1: The control/automation/visibility triangle

Assess your current infrastructure

An essential first step is to look at your key systems and ask how old they are – six or seven years, perhaps? Were they originally home-grown systems, put together on an ad-hoc basis, and are they consolidated and consistent, or a mixed bag? Are they running the latest version of vSphere, or are they on an older release because of resource constraints, upgrade fears or compatibility problems? And do they incorporate older processor chips that lack the latest manageability and virtualization extensions?

If the answers to any of these questions look familiar, it should not be too surprising: humans are creatures of habit, after all. If something works for now, we are likely to carry on doing it or using it for as long as possible. As the popular saying goes, "If it ain't broken, don't fix it."

The danger is that these behavior patterns may (subconsciously) ignore economics, opportunities or risks. Perhaps the additional management overhead and maintenance expense that they require is not properly recognized as a cost because "it's just the way things are." Or while the platform is not visibly broken, its complexity or its outdated hardware and software have introduced unnecessary risks and constraints.

And risk is not just technical or business-related, it can involve legal penalties too. For example, if you lose or expose personal data, the tests that data protection regulators will use to determine your degree of culpability can include assessment of whether or not the technical and procedural protections were "appropriate to the risk."

Building the future

Your assessment may well reveal that your current infrastructure or your Do-It-Yourself (DIY) strategy does not give you the control, automation, visibility and protection from risk that is needed to move forward, and that there's no good business case for moving everything to the public cloud. In this case, you will typically be offered two options for developing and building a consolidated, modern, consistent and scalable platform that can still be cloud-connected if required: classic converged infrastructure (CI) or hyper-converged infrastructure (HCI).

Converged and composed

What's not always made clear by keen salespeople, though, is that there are considerable similarities between the CI and HCI approaches. Most notably, they both involve converging the compute, networking and storage elements within a single management layer. Automated controls then arbitrate between them, compose VMs by allocating the necessary resources on demand, and so on.

In the past, there were significant differences at the hardware level. HCI typically ran those three key elements – in virtualized form, of course – on the same physical server, whereas the hardware components in CI were separate hardware devices. HCI was a modular scale-out system, easy to deploy as a 'data center in a box', and with little or no visibility into what happens behind the scenes. In contrast, CI – whether delivered as a preconfigured appliance or a reference architecture (blueprint) – made it possible to scale or vary the individual hardware elements as required, while retaining overall consistency and manageability.

However, the overlaps between them are increasingly apparent. For example, some HCI implementations now allow the three key elements to be scaled independently, CI-style. This acknowledges that while modular HCI can be a good fit for smaller organizations, and for workloads that scale horizontally, it has limitations. Many applications benefit from the ability to scale up as well as out, which means decoupling the expansion of storage from compute and networking.

What we are seeing is therefore the growing usage of **composed architectures,** a relatively new way of describing something that has actually been around for a while now. In this model, the hardware – whether converged or hyper-converged – is virtualized, disaggregated, and then reassembled over the network and integrated at the software level.

Key requirements

Working from the discussions above, let us look at the considerations that emerge. First, our modernized systems must not only be able to re-home or re-platform existing VMs, they should also offer PaaS and IaaS support for future container and microservices-based applications. They may also need to provide bare-metal support for applications that cannot easily be run in a virtualized or containerized environment.

They should be simple to automate, manage and monitor, and offer significant advantages over the systems they will replace, whether that is lower cost of operation,

improved service levels, etc. Based on those expectations, we can list some key requirements in terms of hardware, software, and support:

- Fully integrated stack,
- Fast and easy implementation, with a single, local, point of contact for purchase, warranty and maintenance,
- Scale-up as well as scale-out, as service needs can vary dramatically,
- Independent functional expansion using standardized and preconfigured modules or elements,
- Integrated, standardized and centralized management and monitoring.

Given the above, and taking a long-term view, self-build or DIY may still be appropriate in some cases. However, a pre-integrated and software-defined infrastructure based on converged or hyper-converged hardware may provide a better fit most of the time.

What hardware you choose will therefore depend on the relative importance of those list items to your specific organizational needs and application mix. Consultation with an experienced IT partner or supplier is likely to be very helpful here, of course.

As a very simple example, for a small site or branch office, modular HCI can offer an easily deployed off-the-shelf answer. However, for vSphere at enterprise level you will want to consider its likely need for scale-up, and for the ability to add more storage or compute power independently of each other. This may well take you down the route of a fully-integrated and automated software stack running on converged infrastructure.

Example: PRIMEFLEX for VMware vSphere

As an example of such a converged infrastructure, and to show how an organization could use it both to host new services and to consolidate and modernize existing VMware-hosted applications, we will use PRIMEFLEX for VMware vSphere from Fujitsu, the sponsor of this paper. While nothing we say here should be interpreted as an endorsement or recommendation of this solution, talking around a specific offering like this enables us to move beyond the theory, and illustrate how some of the key principles we have been discussing can be translated into operational reality.

Fully integrated stack: The first important checkpoint with any converged system is that all the components – both hardware and software – must have been configured and thoroughly tested to operate together. This requires experienced suppliers and a known set of components. For instance, each PRIMEFLEX for VMware vSphere system integrates Fujitsu PRIMERGY RX servers with ETERNUS storage, also from Fujitsu, IP switches from Extreme Networks (with the option also of Broadcom Fibre Channel switches), and of course VMware vSphere software. This is a well-established combination of enterprise class components and software from trusted sources, pre-tested and validated for interoperability and compatibility before shipping.

Fast and easy implementation, with a single point of contact for purchase, warranty and maintenance: Speed and ease of implementation can be achieved with CI as long as it meets other key expectations, most notably the requirements for standardized, integrated management and a single point of contact for supply and support. The

PRIMEFLEX systems achieve this by integrating all their components under Fujitsu's Infrastructure Manager (ISM) software, delivering them as a pre-configured appliance ready to go, and by providing holistic support from within the company's extensive technical support umbrella.

Scale-up, as well as scale-out, as growth rates can vary dramatically: This is an area where CI can offer advantages over the modular HCI approach. Sure, many growth requirements can be met effectively via scale-out alone. However, VMware vSphere can also benefit from a platform that scales up as well as out. CI systems such as PRIMEFLEX for VMware vSphere are highly scalable and expandable, allowing you to increase the capacity and capability of the hardware platform. Its components can be swapped for more capable or powerful ones, or more capacity linked in from elsewhere in the data center (within the limits imposed by the hardware suppliers and the platform itself, of course).

Independent functional expansion using standardized and preconfigured modules or elements: As the total workload grows, you may require more compute power, system memory, storage or network bandwidth. Converged infrastructure such as PRIMEFLEX for VMware vSphere can be both appropriate and cost-effective here. Because it is converged from individual elements, those elements can be scaled independently. Need more storage? Add more, with no requirement to add potentially unneeded extra compute and network capacity at the same time.

Integrated, standardized and centralized management and monitoring: Converged systems such as PRIMEFLEX for VMware vSphere are handed over not just with vSphere ready to run, but with tailored end-to-end support services plus management software that covers the full stack – as mentioned, in this case that's Fujitsu's ISM.

Comprehensive and effective management software is an essential element of any converged infrastructure because it is how you achieve and simplify those three necessary tasks of control, automation and visibility. So we see, for example, that ISM can provide centralized control of the data center – that's servers, storage and networking – through a single user interface. More significantly, it provides that level of simplification and automation both for existing and new application environments.

The consequence is that, once it has been installed in the data center, a PRIMEFLEX for VMware vSphere system can be largely a hands-off affair. As discussed above, system expansion is then possible either within the system (scale-up) or by tightly clustering it with another PRIMEFLEX for VMware vSphere converged system within the same ISM management environment.

In conclusion: The future is hybrid IT

It's taken some of the public cloud providers a few years to acknowledge it, but not everything will or should move to cloud, whether public or private. In other words, traditional IT – a term that now also embraces VMware vSphere and other key virtualization platforms – is not going away any time soon.

Most organizations will continue to use on-site private cloud, traditional IT and hosted technology alongside shared services such as public cloud, SaaS and so on. Yes, there

may be opportunities and good reasons to "lift and shift" some on-site applications into the cloud, or re-architect them to be cloud-native, but at the same time, many of us will have equally good reasons to pull down apps and services from a public cloud and run them on-site.

Old infrastructure ages and becomes both less cost-effective and harder to maintain and manage. Yet at the same time, older services may still have extremely important roles to play – they are not just waiting for decommissioning. Virtualization allows us to abstract the service from the infrastructure. We can now reduce complexity by modernizing the infrastructure and the platform, turning off the old infrastructure as it is replaced.

The interesting thing about the likes of VMware is that as well as running your organization's current applications, your virtualization platform is also your stepping-stone to the future. That's because as well as enabling you to shift existing applications into a cloud if need be, it can also form the foundation for your new container-based and cloud-native services.

Ultimately, all of this makes it essential that you keep the underlying hardware platforms as consolidated, consistent and up to date as possible. If you don't, then what you win from virtualization, in terms of platform management advantages, will be lost on the infrastructure management side, thanks to the added overhead associated with maintaining and managing a mishmash of hardware and software. The question therefore is not 'if' to update your infrastructure, but 'when'.

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