Enabling Private Cloud
There has been a tsunami of information about cloud computing in the last 12 to 18 months. It can be overwhelming, confusing, complex – and for those making system architecture decisions it can be daunting. However the undeniable truth is that IT departments are seeing the benefits of moving to an “as a Service” world and adopting a model that combines on-premise infrastructure with public cloud computing.

Describing data centre trends in broad conceptual statements is one thing, breaking it down into the essential components all CIOs must consider to develop a sustainable cloud infrastructure is quite another.

This whitepaper looks at how to move towards “IT as a Service” based on a private cloud, with the ultimate goal of achieving the best balance of cost efficiency and agility through a hybrid approach.

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“Cloud computing promises to bring sweeping changes to the way organisations use information technology. It is currently a focus of attention in business, government and the IT industry. Despite this, decision-makers are still struggling for insights on what it really means in practice…” KPMG
CIO Challenges

“Businesses need fresh thinking about the architecture of tomorrow because merely rehabbing or adding on to the existing plan will simply not meet the wildly different and more-demanding requirements of tomorrow.”

*Forbes*

“Classic” data centre infrastructure (as shown on the previous page) was never built for virtualisation or delivery of IT as a Service and is not designed to scale or interoperate with external compute and storage.

CIOs are playing a critical role in the transformation from “traditional” IT and data centre infrastructure to cloud-enabled services and in doing so, in how IT is enabling new business models: Without question, most CIOs must have detailed strategies and plans for cloud computing and many already have those in. But the strategic CIO will use the next several months to collaborate with the CEO in upgrading that tech-centric plan into a broader vision for a sweeping business transformation of the entire enterprise."

Before we look at the six steps that CIOs need to consider to transform their infrastructure, it’s helpful to look at the challenges that are driving the need for change in the first place.
In a typical company, approximately 80 to 90% of the IT budget is locked in to non-discretionary funding, or "business as usual". 

By 2020, data objects will grow 67 times, while data will grow 44 times. 

In Australia, data is estimated to grow 240% between 2012 and 2014. 

“50% of Enterprise Class data centres will be technologically obsolete within 24 months.” 

“While 75% of the information in the digital universe is generated by individuals, enterprises have some liability for 80% of information in the digital universe at some point in its digital life.” 

Fast provisioning is a central challenge in the classic siloed model. IT departments have to cope with multiple management points. In the diagram shown each rack mounted server will have, typically, around 20 cables coming from it. Each must go into a switch port, each switch port must be configured and each switch must be managed. In a typical 16-port switch each time a 17th server blade is added a switch needs to be replaced or added, which just adds to system downtime.

Backup and recovery in a siloed data centre also creates issues. Business and legal data retention, archival and retrieval requirements are becoming a genuine issue for firms.

Storage growth is inevitable, unless the organisation has an incredibly strict and policed data de-duplication process. The traditional data centre was never designed with virtualisation in mind. Inevitably the siloed structure means you have isolated pools of storage “trapped” in each separate system unable to be shared. This is inefficient and a great deal more expensive.

A siloed IT infrastructure hampers the effectiveness of the IT department itself. IT teams tend to be structured around the technology not the services they provide. Often strategic gains are stifled by the challenges thrown up by a lack of interoperability. The IT infrastructure is designed around technology rather than the needs of the business. A great example is the rapid shift to Bring Your Own Device (BYOD) strategies. With a siloed infrastructure it’s almost impossible to bring together the required pieces of technology to allow mobile devices to access the corporate network and data sets in a secure manner.
Technology Architecture in Transition

“The data centre is in a state of transition from its origins as infrastructure partitioned into siloes of storage, networks, servers and applications. Zones of storage, server and application virtualisation are a “halfway house” to a fully cloud based architecture; be that private or public cloud or a hybrid of the two.

Today’s discussions with IT organisations are dominated by discussions around moving from an application-based silo model, which has been the primary provisioning model for servers and storage, to a more flexible hybrid cloud architecture,

Infrastructure-as-a-service private cloud computing is gaining popularity, but IT organisations should focus long-term architecture design on enabling a hybrid cloud model, where private cloud services combine with public cloud services for better flexibility and cost efficiency.”

Gartner
The application-based design approach started with the application and a dedicated infrastructure under it: services and storage carved out just for that application and its users. Typically these silos are independent of each other; many times there were separate choices made about servers and storage between the different silos. Specialised skills were required for each silo, and often organisations were set up around each tier of service, with dedicated SAN teams, or NAS teams.

To get a new application rolled out, the first step was to purchase and stand up new hardware and infrastructure, and it would often take months just to get the infrastructure ready to put a new application into production. Once rolled out, it was hard to share resources. Stranded excess capacity and horsepower in one silo couldn’t be reallocated to another application that was growing, or repurposed to roll out a new application.

But server virtualisation is changing that and paving the way for a completely different architecture where a single pool of resources can be shared across multiple clients. Server virtualisation has a compelling value proposition, and a profound implication. The value proposition is simple: most servers are under utilised. If you could run multiple applications on the same server, you can reduce your server footprint, drive up utilisation, and save a lot of money and manpower.
“Virtualisation is often the first stage to making more effective use of your data centre. However, to maximise that efficiency, you need to automate as much as possible and ensure you keep a tight lid on storage costs.”

*Lifehacker*

Virtualisation allowed a decoupling of the application from the hardware. Applications became mobile and can moved from server to server for load balancing, moved from data centre to data centre for disaster recovery, and moved into the cloud and back out of the cloud for capacity bursting, flexibility, and cost. IT organisations can build a broad, homogeneous, horizontal server infrastructure that’s capable of running multiple applications simultaneously. And server virtualisation broke the cycle of having to stand up new hardware in order to deploy new applications. You have tremendous flexibility to move your applications around and you can drive a degree of standardisation.

Now as customers are moving towards higher degrees of virtualisation the reality of maximising the sharing across a common infrastructure and adding automation as well as

Self-Service lends itself to what is now called Cloud. From a Private Cloud built by an enterprise to run their ITaaS, or leveraging Public Cloud offerings to complement standard and/or modernised IT infrastructure the goal is the same...lowering IT costs and gaining operational efficiencies that allow IT to respond to the business with a flexible IT infrastructure.

Hybrid Cloud is also a goal of the future with some early adopters already linking their Private Clouds to Public Cloud services. These models will coexist for years, but the bottom line is the application-based silos are ultimately going to get relegated to legacy applications that will never be migrated, or a small set of key applications in the data centre that people believe still warrant their own dedicated infrastructure. The vast majority of the storage and the vast majority of the applications are going to move to the shared infrastructure.
The "six steps" to private cloud are fundamentally based on simplifying the data centre infrastructure.

Most organisations have started on this journey (at the very least, virtualising the non-core applications) but few have virtualised 100% of applications or ventured beyond Steps 1-3 for all core business applications.

While the short-term costs and risks increase as the core applications are moved from a traditional to an “IT-aas” delivery model, the pay-off is quickly realised:

- as new applications are required, with rapid provisioning
- through reduced overhead of managing the data centre (which breaks the 80:20 ratio of maintenance to innovation).
Step 1: Standardise and simplify

Data centre infrastructure typically has separate management interfaces for every server, storage array and networking component. This represents significant administration overhead in managing these systems or making changes.

Virtualising and unifying as much of the architecture as possible significantly eases management, often reducing between 20 and 60 points of management down to just five.

Imagine if you had a single management entry point:
- To provision network and server
- To provision storage and virtual machines
- To monitor backups, archival, replication and disaster recovery

So in this first step we take all the network components and create a single management point. We do the same with the storage and compute resources. This simplifies and standardises the data centre’s management structure.
Step 2: Cable consolidation

By deploying a single ubiquitous fabric, systems can dynamically deploy I/O capacity according to performance requirements. Think of an eight lane highway with four lanes open southbound and four lanes open northbound, it would be much more efficient if the central barrier could be moved around based on traffic flow. So, like the Sydney Harbour Bridge, in the morning peak hour there are six lanes inbound to the city and for the afternoon exodus it changes to six lanes outbound.

So in this second step we reduce the number of network connections. Typically there are cables for the core network (two for resiliency and probably another two for additional bandwidth), a cable for management, two for storage and if we have a DMZ - or a public facing switch – another two cables. This means a total of nine cables coming out of each server. If you add a new server, that’s another nine cables.

In a unified network, each server is connected via a single cable – with a second one for resiliency. Dynamic data centre bridging (DCB) allows for a single 10GB pipe to be used for multiple functions and to dynamically assign capacity based on the task required.
Step 3: Storage efficiency

Achieving storage efficiency is an early priority for many organisations and is often a trigger to start the journey towards the Private Cloud. For almost every organisation, storage requirements are increasing at a very rapid rate. Continually upgrading and adding to your storage capacity is a continual burden for IT department budgets. Making matters worse, in most cases only 5% of stored data is active at any one point.

Auto storage tiering enables an organisation to structure its stored data in an optimal way. Blocks of data that are accessed frequently or require very fast access can be moved and stored on very fast (but expensive) SSD disks, while less crucial or infrequently accessed data can be stored on SATA disks, which whilst slower, are much cheaper. The net effect is a dramatic reduction in storage costs.

AUTO TIERING - HOW IT WORKS

Flash/SSD | Fast Disks | Capacity Disks | Cloud Storage
---|---|---|---
Tier 1 | Tier 2 | Tier 3 | Tier N

ABOVE average moves UP a tier

BELOW average moves DOWN a tier
Step 4:
Stateless compute

Virtualising the compute layer effectively removes a processor’s “identity.” The CPU is transformed into “stateless” processing power and memory. This allows the processor to be dynamically assigned to executing the task at hand. Stateless computing effectively does to hardware what hypervisors do to operating systems.

This translates into much more rapid provisioning of, say, a server blade. By establishing and using service profiles and templates provisioning becomes almost instantaneous. For example, the time to provision an ESXi host is less than ten minutes.

By using service profiles we can migrate the identity of any server across multiple blades. Blades can be made dual purpose; for example, an ESXi host could be repurposed as an SQL warehousing app in an evening.
Step 5: Uniform Scale

Private cloud technology allows organisations to scale their technology infrastructure in a uniform fashion rather than in large cost “steps”. In a siloed architecture design, capacity cannot be dynamically reassigned meaning as capacity is reached large investment in servers, server racks and switches are required, resulting in big investment “steps.”

Cost prohibitive “break points” mean organisations will often delay rolling out increased capacity. The inability of the system architecture to flex and grow with the needs of the business leads to a reduction of the organisation’s overall operational effectiveness.

- No Concept of “Uniform Scale” within the Component technology and the “stack”
- Creates Cost Prohibitive “Break Points” (Further Challenged by higher density technologies such as VDI)
Step 6: Self Service Delivery

Once we have achieved a fully virtualized data centre, we can transform from a converged data centre infrastructure to a private cloud. This comes with one additional step: automation and Orchestration.

By adding this final layer we can enable service catalogs, provide user self service and automated application scale up and down. While the investment in orchestration capabilities generally represents less than 5% of the data infrastructure cost, it provides the greatest operational efficiencies of the six step journey to private cloud.

By using a single orchestration layer users can quickly provision storage, network, compute and applications from a single pane of glass and enable services such as backup and replication.

This also enables IT departments to provide things such as charge back & show back; this gives a true holistic view of the data centre and applications as well providing reporting on infrastructure utilisation.
How can Logicalis help you move to an efficient Private Cloud delivery model?

1. **Assess your current state.** Start with assessing the current data centre infrastructure: how many IT staff are required for administration and support, how long do applications take to provision, are there any business continuity risks? This identifies gaps in current capability and provides a benchmark to build the business case for a new IT delivery model. (We deliver these capabilities through our fixed costs assessment services.)

2. **Define the end-goal.** Working with your IT organisation, we document the ideal architecture that reduces operational costs and support current and expected business requirements. This includes risk mitigation, delivery of applications to mobile devices and projected data growth. (It’s typically delivered through one or more structured workshops.)

3. **Build a Strategic Plan.** Using the data collected from the previous steps and a workshop approach we define a 3-5 year plan. A Roadmap is produced that incorporates tactical actions (like storage or compute upgrades) with strategic deployment of new technologies.

4. **Develop a Pilot.** As the first step in implementing the Roadmap, we deploy a pilot that validates the approach and demonstrates the benefits of the proposed solution. (In conjunction with our partners, we can often deliver these at minimal or no cost.)
Logicalis is changing how organisations design, build, pay for and manage IT solutions. Logicalis is highly skilled at delivering technology, with expertise in data centre networking, compute and storage. We work with customers in all major industry sectors and public services to improve the experience of both front-line workers and back-office IT professionals.

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