Has your Cloud Journey
become Multimodal?

White Paper

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Over the past few years, Essextec has helped many organizations journey through and towards that place we call The Cloud. As the leader of an hybrid cloud advisory practice, I often reflect on lessons learned. The industry has evolved and we too have we grown and reached a point of new maturity, that can only benefit our clients and partners. This paper will share a number of insights gained over the past few years as a practitioner, analyst, and customer.

Lessons Learned

The starting point for these reflections is the recognition that, more than ever, our enterprises - large and small - have been faced with all sorts of pressures. Enterprises operate under multiple stimuli and often with threats that are present on multiple fronts (See Fig. 1). These forces are both internal and external. Customers are changing, the workforce is changing, technology is changing. This list can easily go on. The larger our enterprises, the more complex grows the web of relationships that demands increasingly refined levels of response. These responses must be accurate, efficient, and swift.

How does one address such variety and velocity and do so without breaking the bank?

The Cloud as an Enterprise Enabler and Defense Weaponry

Under this state of attack, it is true that skill matters more than ever - but skill alone won't suffice. A new generation of tools and capabilities is needed to address emerging requirements. There is no silver bullet, no single product that is broad enough to defend our enterprises. Rather, what is needed is a new foundation and tool chest with which our enterprises can build their futures. That new foundation is the cloud and all of the services and features that the cloud offers us as business and technical architects.

The richness of services offered by today's major cloud service providers represents a set of capabilities that can be used to quickly address requests and situations such as those listed previously. What is great is that these services can be easily accessed, activated, and securely assembled without long term commitment.

Fig. 1
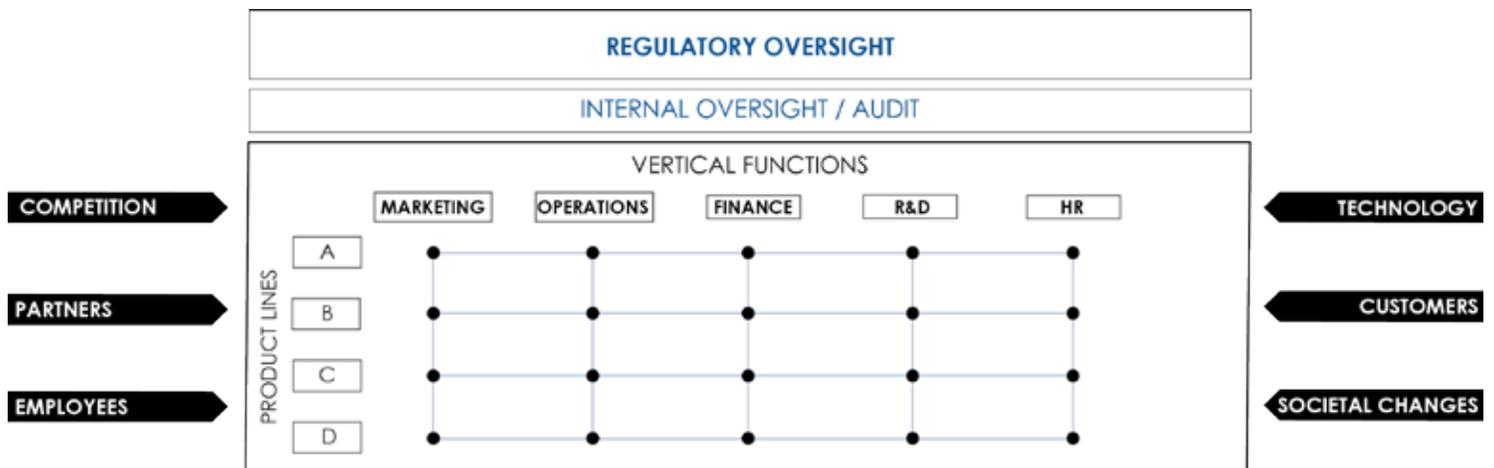
Below is a short list of situations and requests that I have encountered or heard of indirectly. I will bet it won't be hard for you to relate to or find similar ones.

> Business Request: Quick Prototypes [test the waters]

> Code Red: Security Breach [fire drill]

> Modernize our core system [mobile, micro services, APIs, UX]

> Build better business partner Networks [blockchains anyone?]

> Entrepreneurial Pressure [internal , external]

> Analytics Explosion: Volume, Velocity [usage reporting]

> Scaling Expertise [applied Cognitive/NLP/machine learning]

This helps foster a culture of experimentation and innovation — a key step towards the creation of disruptive businesses.

So, armed with a rich cloud services palette where compute, storage, and network capacity is virtually unlimited, our engineering talent can quickly build solutions addressing common and specific requirements and requests. I can recall when teams had to put in considerable effort to first find capacity and then install and configure the tools and services to conduct even the very basic of experiments.

Today, assuming that a set of key prerequisites are met (federated identity comes to mind), it does not require a lot of time to build out a test network, populate it with the appropriate compute nodes, attach multi terabytes of storage, and load complex data. With an accelerated build-out, it becomes possible to start conducting data

explorations, at scale, using a multitude of distributed computing frameworks.

From an investment perspective, costs are minimized from the start. All services, including data services, are configured for just-in-time usage, and then released after the experiments are conducted. There is no waste, no over provisioning. With cloud's elastic ability to scale up and down, we have immediate access to quantities of compute and storage that would have been impossible to acquire within a traditional corporate environment. Just imagine asking for 100 VMware images each with 16 GB RAM, 8 cores, and 4 TB storage for a week, on a Thursday afternoon ready for Monday morning access. Very few organizations would be able to provide even this modest amount of capacity.

In more concrete terms, just consider how time to value is compressed when a team develops using Platform as a Service (PaaS) approach. With PaaS, teams no longer have to provision, install, and configure environments. Now, a three-month effort can mean complete production deployment instead infrastructure-only deployment.

Only the cloud can make all of this possible.

The Cloud Is More Than Just Infrastructure

Even though many organizations have accepted a cloud computing model and have been slowly been migrating workloads, there still remains a perception that Infrastructure as a Service (IaaS) is the primary use case for cloud. Infrastructure does remain very relevant, but the reality is, today only a small portion of legacy workloads have been moved to the cloud. A recent survey reported by Forbes magazine has indicated that it will be another five to 10 years before 95% of enterprise workloads are moved to the cloud.

Conversion and migration of legacy workloads have only been able to move so fast. Constraints include platform incompatibilities, system complexity, conversion costs, and even financial accounting nuances such as deprecation schedules of existing assets. Also, let's not forget that migration of legacy applications competes directly with new application demand, while "Cloud First" will dictate that be born in the cloud.

Cloud is much more than infrastructure. It is important to recognize that the service palettes offered by the major cloud vendors are beyond rich. Cloud vendor product portfolios now include Infrastructure services (IaaS), platform services central to developing new applications, as well as coarse grained software products (SaaS) that can immediately deliver specific business needs.

Examples include specialized needs such as expense reporting, financial performance management as well as complete replacements for corporate email

and email compliance — systems that once required large investments in staff, software and equipment. Do you want to build an integrated call center, that's global in reach? New cloud build blocks make this possible. And then there is PaaS: Platform as a Service. When it comes to enabling application development, the broadness and scale of what is offered is close to amazing. A few years ago, cloud service catalogs could easily fit on single pages. Today, it is a challenge to easily represent all the services in way that they can be displayed on a single page without having to resort to microscopic fonts and images (See Fig. 2).

Fig. 2

What do such rich palettes tell us ? The answer is simple: think twice before building runtime infrastructure required for a new application. PaaS providers have built and offer a multitude of application servers with support for most of the popular programming languages and development frameworks. These runtimes do not require much in terms of installation and integration. They are clustered by default, load balanced, and elastically scale. PaaS providers offer all sorts of data management and storage options. Managed RDBMSes, MPP data warehouses, NoSQL clusters, key-value caches, and massively scalable object stores are just a few examples.

And there is so much more. Developers using PaaS also have access to rich sets of security related building blocks so that identity management and authentication can be easily integrated with applications and other available cloud services such as proxies.

Cloud platforms offer consistent APIs and security models that proactively elevate levels of defense and, just as important, remove the need and risks of integrating disparate services. Coordinating the processing actions and flows of data across system components with different queuing systems, commercial, and open source. Serverless stream computing services make it easy to deal with data that arrives in motion or needs to be processed in parallel on a large scale. Gone are the days when batch and sequential processing were the primary ways to solve data intensive problems.

Lastly, what is most exciting are the advanced services to which architects have access. These powerful services make applying data science and machine learning techniques easily consumable – all without having to worry about complex clusters configuration and error prone integration. For example executing a machine learning pipeline written in Python across a 50 node ephemeral Spark cluster against a 100TB, 400 billion event cache can now be done without any system administrator participation. These advanced services also include exciting cognitive computing, initially popularized by IBM Watson, that can accurately interpret unstructured content using Natural language processing (NLP), convert text to speech and speech to text, analyze and classify static images and video, detect intent and sentiment. AI-powered services such as these are key to building analytics-driven applications that are intelligent, predictive, and help scale human expertise for classes of problems that otherwise would require armies of human analysts and clerks.

Multimodal is the New Normal

So the case and the power of cloud is clear. The options are many. How then do enterprises envision their cloud journeys? This is where experience guides us the most.

In the early days of cloud, organizations and vendors alike imagined that cloud programs where mostly about taking a portfolio of applications and workloads, prioritizing them, and then systematically forklifting them to the cloud. This was in part due to the fact that the cloud, seen primarily as an IaaS story, was reminiscent of the physical to virtual revolution of the previous decade. However, today's cloud is more than infrastructure. Cloud is not about changing where virtual servers can be hosted. It is about reimagining the possible, asking questions and evaluating if there is a better way to do things.

With the concurrent availability of rich sets of capabilities delivering IaaS, PaaS, and SaaS, a single stream program that takes enterprises to the cloud, is far from reality. Instead what we now consistently see across client environments is a reality that is multimodal. With diverse sets requirements arriving at different times and speeds, organizations are de facto operating in three distinct modes : slow, fast, and very fast.

The following diagram depicts this multimodal world (See Fig. 3).

Legacy workloads are migrating in what we can label the slow lane. Through a detailed planning, strategy, and design project that follows a structured methodology, we now can move "legacy" workloads to a cloud environment with repeatable success. Typically this means moving what is today running on local hypervisors such as VMware , Xen, or KVM to a CSP's virtualization layer. These migration programs are not based on a 1-to-1 conversion and lifting of servers from one environment to another lift-and-shift. An effective methodology will clean house. It will include options to consider shifting management responsibilities to the cloud service provider. A good methodology will also help inform whether rearchitecting using cloud native services makes sense as part of the move or whether significant changes are best left for future versions of the product. Based on experience, the latter seems to be the better choice.

In this multimodal reality, there is a constant demand for new custom applications. These solutions are quickly coming to life at a faster pace by taking advantage of rich PaaS services, often without the need to build a single server. Developers are able to write code that binds to existing or prefabricated services. Scaling, resiliency, security are features inherited from the cloud service provider. This makes delivery of new software very fast. The new multimodal model must recognize and embrace this reality as applications built in this way often will give organizations a "first" or "quick mover" advantage.
But there is more. The emergence of new SaaS offerings are forcing a quick adoption of software that is cloud native, fully managed, and sold by the head count. Salesforce.com is the classic example, yet by no means the only one. Evolution to SaaS is the fastest mode in which cloud adoption programs are taking place. As long as prerequisites (such as federated identity) are in place, adoption of SaaS-based products is not expected to slow down. When a software product or feature is available as SaaS, many organizations will prefer to shift the burden of managing the application to the cloud vendor. Lines of business, having embraced a more consumer like attitude in provisioning of IT services, will drive the velocity with which SaaS enters the enterprise.

Fig. 3

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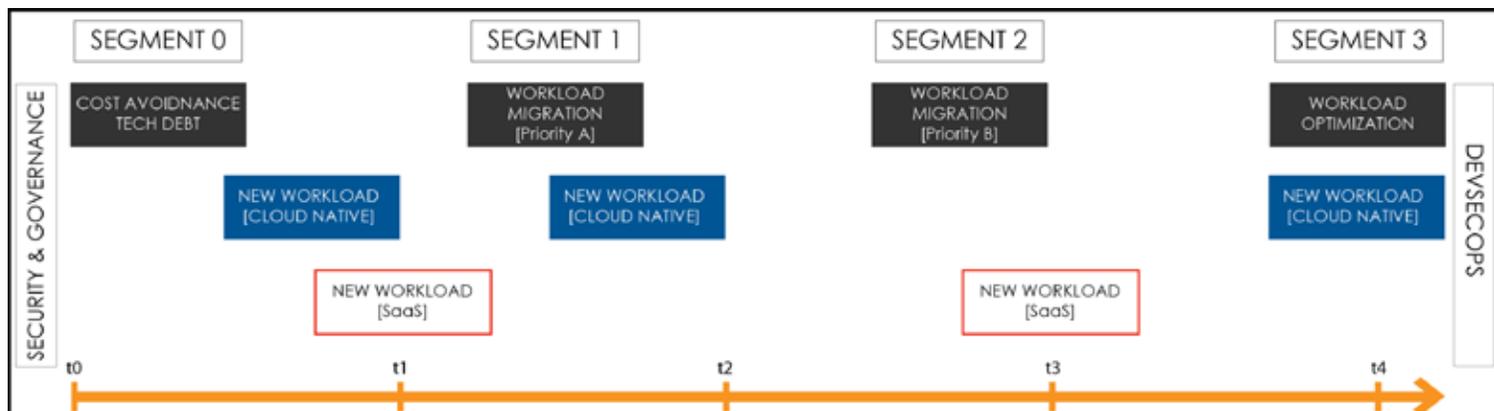
Vendor Lock-In: Less of a Concern

With such comprehensive platforms and comfort in adoption, what about independence and portability? There was indeed a time when portability was a major concern when making IT decisions. We have seen the specter of portability rear its ugly head during the operating systems wars of the early nineties, followed by the browser battles when the web and associated development paradigm took hold during the Internet boom. Portability was also a concern when dealing with choice of SQL syntax or choice of programming language compiler. So, is vendor lock-in a major concern today? The simple answer is that it can be but we believe that is it worth the trade off.

To take advantage of the cloud's full potential, its ability to support rapid development and experimentation, the goal of maintaining absolute portability is incompatible with the power of cloud. Selecting a primary cloud service provider will mean inevitably subscribing to services that might be deemed as proprietary and non portable. This is a trade off that will need to be made. Not using some of a providers key services such as their specific flavor of function as a service or stream based computing, will mean building and maintaining complex software. Moreover this will also mean delayed time to value and higher risk and possibly giving up on key experimentation that can lead to new disruptive business models.

But here's some good news. Cloud Service Providers (CSPs) themselves are also interested in fast time to value and lower maintenance. They are successfully achieving these goals by basing their products and services on open source foundations. This means that they have found ways to enhance products and frameworks that we, as IT users are likely to have already discovered and use on our own. Take the case of building an enterprise grade management system for containerized applications. The CSPs, by selecting open standards based products such as Docker, Kubernetes, Helm, and Terraform as the foundation to build their private cloud product, help ensure that we, as enterprise builders and architects, can work with products we already know and like. It also means that a significant degree of portability is guaranteed. This is a win-win situation: portability is combined with double value add. Adopters of services built in this manner will benefit from future revisions of the underlying open source building blocks as they are supported by large development communities. At the same time, the value add layer and integration provided by the CSP will also grow and benefit from a strong foundation and, ultimately, provide the consumers of the services a better product that will require less integration, more features, and be of higher quality.

We have seen this cooperative model before. It is at the foundation of the Linux revolution where Linux distribution maintainers add value to the base open source product (kernel and core utilities). This model has thrived on a bidirectional flow features and code contributions from industry to the open source community. So it is no surprise that IBM is following

this model for their next generation private cloud software which customers to run containerized applications across all imaginable platforms including the Mainframe. We are, once again, at a threshold in the models that are used to develop, provision, deploy and maintain modern software.

The lock-in story gets even better. With a shift to a software defined foundation, building and deploying new software will depend and rest more on code. Since this code will be based on open source products and frameworks, this will ensure that vendor dependency is minimal. For an example, a Chef recipe will essentially run the same whether it is executed on my server or a cloud service provider's managed Chef environment. A docker file that defines a container is just that, a portable definition of how to configure a container. That's the beauty of leveraging open standards.

Cloud is not about changing where virtual servers can be hosted. **It is about reimagining the possible, asking questions, and evaluating if there is a better way to do things.**

Conclusion

So what can we conclude? First we can say that modern workloads require flexibility and this flexibility can only come from the Cloud given the richness of the platforms that have emerged. Attempting to compete with a full on-premises model to deliver similar functionality will be very difficult, extremely costly if not impossible to match.

The shift to "Software Defined" helps with the lock-in problem and provides a way to implement DevSecOps philosophy for creating and maintaining products. This means that infrastructure can be defined in code, security compliance can be defined in code, and data definitions themselves can be defined in code. "Data as Code" doesn't that sound strange?

Lastly, the reality that Enterprise requirements and requests will continue to arrive along three lanes, slow, fast and very fast, multimodal operation is the most realistic model of operation that will address the pressures that organizations are faced with. Multimodal operation will ensure that all parts of a business are able to benefit from advances in technology and at the same time, run programs that also continuously will self tune, and optimize for cost or new requirements.

So let's allow the Cloud to enable our Enterprises to grow, compete and defend themselves in ways that just a few years ago were almost impossible to imagine.

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