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Application Delivery Controllers: Making the Cloud Better

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APPLICATION DELIVERY CONTROLLERS: MAKING THE CLOUD BETTER

INTRODUCTION[1]

It is an online world. Whether for internal business operations, business-to-business engagements (B2B), or business-to-consumer transactions (B2C), the means to get things done is increasingly online. Terrestrial and wireless broadband networks, and escalating levels of mobile device ownership, already beyond one per person, are creating an anytime, anywhere online reality.

In essence, this online reality reflects the relocation of applications—fully or partially—from end-users' device processors and over local area networks (LAN) to servers remotely hosted in distant data centers. Correspondingly, interactive face-to-face is replaced or augmented with face-to-screen. What was once exclusively done in physical environments, such as shopping, education, and banking (a long time ago), are accomplished on a virtualized basis through connected devices.

Cloud computing, with its elasticity attribute, pushes this reality outward. Cloud computing and storage platforms hosting applications and data can be in multiple locations, and potentially chosen dynamically rather than in just one, or maybe two, static locations. Furthermore, platform ownership and end-to-end, hands-on management is removed from the application subscribers in Software as a Service (SaaS), and from application owners in Infrastructure as a Service (IaaS) cloud models. Also, cloud network connections are a mix of dedicated and shared networks, with more being over the Internet in order to support anywhere access; and, for a subset of cloud subscribers, to economize on bandwidth expenditures.

Viewed collectively, these trends portend a hollowing out of enterprises' control and oversight in the application experiences of their end users. Control and oversight, in essence, is distributed among multiple parties—data center owners, the cloud services providers, network operators, and application developers—with enterprise influence varying across this supporting cast.

This situation is not new. In the pre-cloud era, application delivery controllers (ADCs) and content delivery networks (CDNs), as the front-end to Web servers, were used by enterprises to produce reliable, high performance online experiences for their end users. ADC adoption by cloud services providers and enterprises in support of their cloud-based applications is growing. In this report we examine the ADC approach to cloud services.

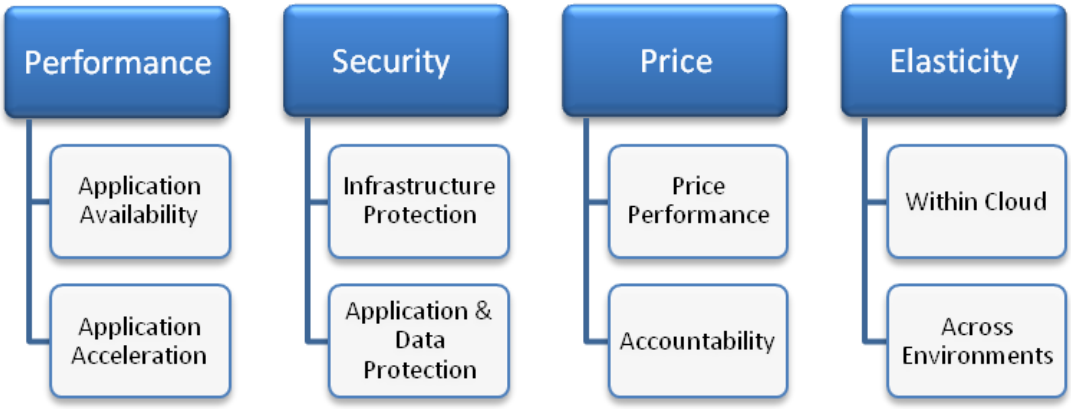
[1] Please note that the insights and opinions expressed in this assessment are those of Stratecast and have been developed through the Stratecast research and analysis process. These expressed insights and opinions do not necessarily reflect the views of the company executives interviewed.

MORE THAN PERFORMANCE

When examining ADCs, the first apparent element of this solution category is that its capabilities are not limited to enhancing the online experience, or performance, for end users. Security is also very prominent. Price and elasticity also fit into the capabilities portfolio, and take on greater importance in cloud deployments. Automated orchestration is also instrumental in driving ADC capabilities and attributes into genuine and systematic services offered by cloud services providers. These ADC cloud services are present in two service types: (1) as an embedded part of the cloud service offering, such as a SaaS application, or (2) as a feature option to enhance the cloud customers' hosted applications; for example, as a feature option in IaaS.

Shown in Figure 1 are the high level elements of each of the four ADC capability groups. They are described in greater detail in the sections that follow.

Figure 1 – ADC Capability Groups



Source: Stratecast

Performance

Two primary areas fit into performance: availability and acceleration.

Application availability – Load balancing—locally, with a cluster of ADC appliances, or globally, with appliances spread among multiple data centers—has been instrumental in supporting continuous availability, as traffic demands spike, and in supporting business continuity. Virtualized ADCs, a more recent development, are another

means to accommodate traffic spikes—and without additional investment in ADC appliances; users merely spin up virtualized ADCs on available servers. An ADC cloud deployment takes the notion of scalability without asset investment up another notch, as virtualized ADCs are hosted on the cloud provider's, not the enterprise's, servers.

- ***Application acceleration*** – Application acceleration is present in many discrete pieces of technology. For this general discussion, we summarize into two. The first is offsetting the time lag caused by distance and network operations (e.g., routing, peering, communication protocol behaviors). Compression and communication protocol behavior modifications of various kinds serve this purpose. The other element of application acceleration is process offloading. Rather than funnel all processing to the Web servers, bring a portion upfront to the ADC where specialized processing can speed end-user interactions.

  Content caching and SSL acceleration are two prominent forms of application acceleration. All of these capabilities are a natural pairing with applications hosted in a cloud environment. However, other than the investment avoidance benefit of cloud, the acceleration lift of these capabilities is similar to functioning in front of premises-based Web servers. Where the difference becomes interesting is in portability. If ADC acceleration functionality was allowed to float among several cloud data centers, or cloud data centers and enterprise on-premises data centers, location of virtual ADCs could be based on minimizing distance or other forms of network latency between Web services and end users.

Security

Strategically located in front of Web servers, ADCs are natural traffic gateways; and, as gateways, can support a growing array of security functions. Again, in summary fashion, security functions can be collapsed into two categories.

- ***Infrastructure Protection*** – Complementary to load balancing, this technology category also supports the objective of availability. Rather than distributing traffic to serve more end-user interactions, its purpose is to deflect illegitimate traffic that would otherwise crowd out legitimate end users.

  Headline-making over the last few years have been Distributed Denial of Service (DDoS) attacks. Equipped with the means to identify DDoS attacks, the objective is for the ADC to absorb and mitigate DDoS traffic before it enters a Web server. DDoS attacks are typically classified as volumetric or application layer. Aptly named, the goal of volumetric attacks is to overwhelm the front end processing of Web servers, network connections, or both, with a flood of transactions. Lower in transaction count, application layer attacks are resource

intensive per transaction. Either type contributes to attackers' objectives of undermining the application owner's ability to serve its constituents, or causing the application owner to spend excessively to process both legitimate and illegitimate traffic.

- ***Application and Data Protection*** – This broad category includes several security technologies, with objectives to protect the integrity of the application and to defend against illegitimate or unauthorized outflow of sensitive data. Included in this category are Web application firewalls (WAFs), data leakage prevention (DLP), and access gateways (or SSL VPNs).

  The primary advantage for including infrastructure, application, and data protection in ADCs is the consolidation of functionality from a single vendor on a single platform. Offering these technologies on a virtualized basis, and deploying in cloud environments, produces functional parity with dedicated ADC appliances; the same security functionality an enterprise has in its on-premises data center is replicated in cloud environments. Moreover, with exposure of confidential data and unauthorized application access noted by most IT executives as top cloud security concerns today, the availability of application and data protection technologies has the potential to lower these concerns, and set the stage for more data-sensitive workloads placed into public clouds.

Price

Price, like the other functional categories, is captured within two domains: price performance and accountability.

- ***Price Performance*** – In the cloud, low cost scalability is critical. Without it, the cloud providers' ability to profit by offering cloud services is diminished. Fortunately for them, the history of ADC appliances has been marked by continuous introduction of bigger appliances; improved architectures to support higher throughputs and more concurrent sessions; and support for a greater range of functionality (e.g., security), without degrading overall performance.

  For cloud providers that use ADCs to support all customers equally (i.e., service embedded), the big box ADC appliance is a means for cloud providers to offer capabilities to their cloud tenants at a price point that each tenant cannot reach due to its smaller size. Along with advancing architectures is the ability to segment the ADC appliance. With this capability, cloud providers can support multiple cloud tenants, with each having its own set of ADC functions and policies within the same appliance—customization without individual investment. Virtualized ADCs also support this same cloud-like notion.

  With the two—tenant-segmented ADC appliances and virtualized ADCs—the cloud provider has options to support its clients. For example, spin up virtual

ADCs for unpredictable traffic spikes, or allocate an ADC appliance partition for more enduring traffic levels. If the functionality is the same, the choice could be transparent to the cloud tenant, and invaluable for the cloud provider in optimizing its infrastructure consumption to maximize profitability.

- ***Accountability*** – One of the defining tenets of cloud services is a utility-based pricing structure—pay for what is used; nothing more and nothing less. To that end, ADCs must be able to identify client usage at a granular level that is consistent with how the cloud provider chooses to bill its customers. Correspondingly, cloud clients will demand integrity in usage tracking and reporting.

Elasticity

On-demand expansion and contraction is another defining characteristic of cloud services. That same characteristic must be built into any supporting functionality, whether service-embedded or as a service feature option. While touched on in previous functional categories, the importance of elasticity is worth repeating.

- ***Within Cloud*** – High capacity ADC appliances and segmentation is a natural fit in cloud services. A single investment in one ADC appliance or system allows cloud providers to simultaneously support multiple cloud customers, each isolated from the other; i.e., the traffic behaviors of one cloud customer do not affect other customers served by the same appliance.

  For significantly-sized customers, the cloud provider could revert to a dedicated appliance. If traffic for that customer subsides, the appliance could return to a multi-tenant appliance. Virtual ADCs add to the cloud provider's customer-serving options. With a cluster of commodity servers, virtual ADCs can be proportioned to available servers, running side-by-side with other virtual workloads. Equal in functional capabilities and simplified in provisioning and de-provisioning, the cloud provider gains the elasticity it needs to balance customer needs and profitability.

- ***Across Environments*** – Shortly after the advent of cloud services, the notion of hybrid environments emerged. These are environments where similar workloads span private data centers and public clouds. The ability to extend into the public cloud, and retain the same ADC functionality present in the private data center, with uniform management, is essential to support for hybrid environments.

PULLING IT ALL TOGETHER

In consideration of ADC cloud-only and hybrid deployments spanning three form factors (dedicated appliances, segmented appliances, and virtualization), in support of two service delivery models (service-embedded and service feature option), tight and automated orchestration is an essential ingredient that spans and coordinates the four capability categories. Further recognizing that cloud providers rightly view ADCs as a means to stimulate cloud adoption and improve their bottom lines, cloud customers are also viewing ADC in the cloud as a means for them to support their business objectives and customers better than an on-premises-only approach.

The criticality of operational excellence in orchestration is even higher. Provisioning delays, awkwardness in managing customer settings and policies, lack of functional uniformity, weak performance metrics, sticker shock, integration gaps across a multitude of management systems (enterprise, virtualization, and cloud), and an assortment of other potential operational risks leave little room for error. For cloud services providers and the ADC vendors that support them, they collectively need to hit the proverbial home run the first time at bat.

For cloud service providers, ADC vendors' cloud support is on firm ground and accelerating. Stratecast discussions with several vendors point to the cloud as the next big thing in ADC market evolution. Their attention to the breadth and thoroughness of offerings is reflective of this movement. Also impressive is the number of cloud service provider customers.

In the remaining pages, Stratecast highlights notable aspects of Array Networks' product and product strategy.

Array Networks

Array Networks offers a full range of ADC platforms: dedicated, multi-tenant and virtual appliances. The dedicated and multi-tenant appliances are based on Array's purpose-built hardware; the virtual appliances are hosted on generic servers running VMware, XenServer or OpenXen hypervisors.

The dedicated appliances are available in models ranging from 1.5 Gbps to 120 Gbps in throughput. Dedicated appliances support a single ADC instance, which may be allocated to a lone customer in an IaaS private cloud scenario, or may be shared among multiple customers using virtual IPs (VIPs) to provide value-add load balancing services.

Conversely, Array's multi-tenant appliances follow a partitioned resource approach—where multiple independent ADC instances on a single system are allocated their own CPU, memory, interfaces and SSL processing. This approach allows cloud providers to reduce space, power, and management overhead, while offering customers the performance advantages and guarantees associated with hardware load balancing.

Together with virtual appliances that support full ADC feature functionality, Array's hardware and software solutions give IaaS and SaaS providers plenty of options for offering public and private cloud services, and scaling cloud-based applications.

Array's flexible pricing is an important point of alignment with cloud provider business models. Array's pay-as-you-go subscription and perpetual licenses allow cloud providers to choose the model or models that minimize upfront costs and business risks (i.e., paid but dormant resources).

Integration with cloud management systems for service automation is another noteworthy aspect of Array's ADC solution. The company offers XML/RPC for Command Line Interface (CLI)-level integration; and its eCloud API for script-level integration. OpenStack is also supported for cloud providers to offer load balancing—for example, as an embedded service.

In addition to Array's APV Series ADC cloud solutions, the company offers cloud providers its AG Series access gateway solutions, to provide secure and segmented access for cloud customer administrators and cloud provider administrators. AG appliances are distinct from APV appliances; and this dual approach—APV for customer services and AG for administrator traffic—benefits the cloud provider by ensuring security for all parties, and availing the full capacity of APV appliances for service creation.

Array is currently deployed by IaaS provider SoftLayer and SaaS provider eClinicalWorks, as well as by Huawei in support of its Internet data center and IaaS customers.

Stratecast
The Last Word

"Cloud-ify your IT operations. Agility benefits, alone, will support this transformation." Really?

The reality is that moving to the cloud must be done with eyes wide open. Clarifying business objectives, assessing the likelihood of cloud success (over remaining in a private data center), and having the means to measure success with integrity are essential.

Instinctively, foundational to any successful cloud strategy is the ability to retain capabilities that have been essential in the past and will continue to be essential in the future, regardless of workload location. Furthermore, in moving essential capabilities to the cloud, these too must be cloud-ifed in order for the cloud's purported benefits—operational and strategic—to be realized.

The evolution of Application Delivery Controllers in the cloud is at this juncture. ADCs encompass essential capabilities for an online world, and the business value has been resolute. Moreover, hybrid environments (private data centers and public clouds), and the distributed, dynamic, and multi-tenancy nature of the cloud extenuates the core and expanding value of ADCs.

The good news is that ADC vendors are dedicated to the cloud era. Stratecast research confirmed that these products are advancing quickly in support of cloud providers' service strategies and profitability. This adds to the conclusion that the cloud is truly becoming a better place to be.

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