Simplifying Application Architecture in a Dynamic Data Center through Virtualization

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Application architecture has never really been easy, but the introduction of virtualization may make it even less easy – unless you plan ahead

Most applications today maintain at least two if not three or more "tiers" within their architecture. Web (presentation), application server (business logic), and database (data) are the three most common "tiers" to an application, web-based or otherwise, with the presence of middleware (queues and buses) being an optional fourth tier, depending on the application and its integration needs.

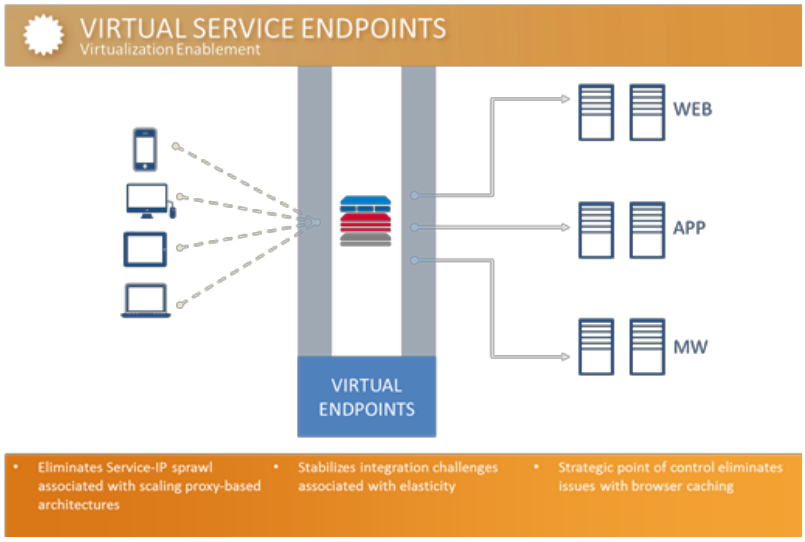
It's never been an easy task to ensure that the web servers know where the application servers know where the middleware know where the databases are during a deployment. Most of this information is manually configured as pools of connections defined by IP addresses.

IP addresses that, with the introduction of virtualization and cloud computing , may be dynamic. Certainly not as dynamic as one would expect in a public cloud environment, but dynamic nonetheless. A high frequency of change is really no more disruptive to such an IP-dependent environment than a single change, as it requires specific configuration modifications, additions or, in the case of elasticity, removals.

It is only somewhat ironic that the same technology that introduces the potential for problems is the same technology that offers a simple solution: virtualization. Only this virtualization is not the one-to-many server-style virtualization, but rather the many-to-one network virtualization that has existed since the advent of proxy-based solutions.

VIRTUAL SERVICE ENDPOINTS

If considered before deployment – such as during design and implementation – then the use of virtual service endpoints as implemented through network virtualization techniques can dramatically improve the ability of application architectures to scale up and down and deal with any mobility within the infrastructure that might occur. Rather than directing any given tier to the next directly, all that is necessary is to direct the tier to a virtual service endpoint (an IP-port combination) on the appropriate infrastructure and voila! Instant scalability.



The endpoint on the infrastructure, such as an application delivery controller, can ensure the scalability and availability (as well as security and other operationally necessary functions) by acting on that single "virtual service endpoint". Each tier scales elastically of its own accord, based on demand, without disrupting the connectivity and availability of other tiers.

No other tier need care or even be aware of changes in the IP address assignments of other tiers, because it sees the entire tier as being the "virtual service endpoint" all the time. It stabilizes integration challenges by eliminating the problems associated with changing IP addresses in each tier of the architecture.

It also has the benefit of eliminating service-IP sprawl that is often associated with clustering or other proxy-based solutions that must also scale along with demand and consume more and more (increasingly) valuable IP addresses.

This decoupling is also an excellent form of abstraction that enables versioning and upgrades to occur without disruption, and can be used to simultaneously support multiple versions of the same interface simply by applying some application (page level) routing at the point of ingress (the virtual service endpoint) rather than using redirects or rewrites in the application itself.

The ability to leverage network virtualization to create virtual service endpoints through which application architectures can be simplified and scaled should be seriously considered during the architectural design phase to ensure applications are taking full advantage of its benefits. Once virtual service endpoints are employed, there are a variety of other functions and capabilities that may be able to further simplify or extend application architectures such as two-factor authentication and OTP (one time password) options.

The future is decoupled – from internal application design to application integration to the network. Employing a decoupling-oriented approach to enterprise architecture should be a focus for architects to enable IT to take advantage of the benefits and eliminate potential operational challenges.

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