

Hardware-as-a-Service: A New Architectural Option For Enterprise IT Services

Top findings:

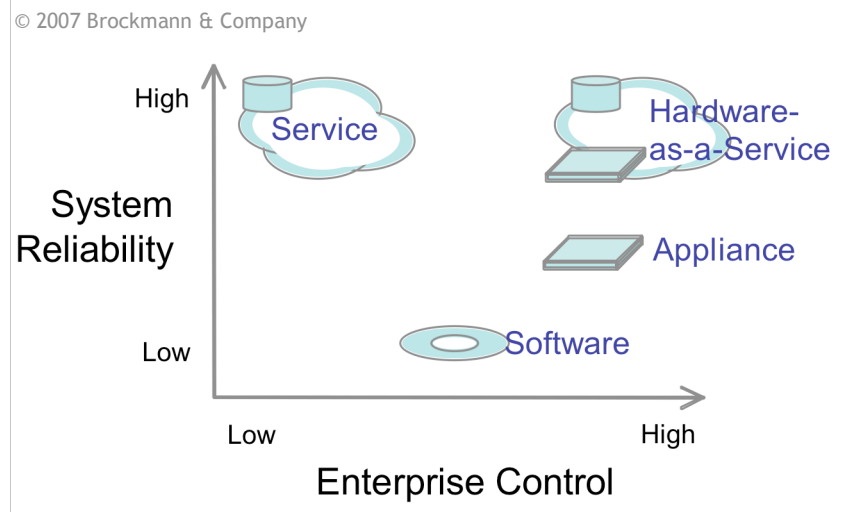
- Packaging innovation plays a role in both consumer and high tech markets
- Hardware-as-a-Service blends the rapid software update features of services and the stability, security and control attributes of appliances
- Enterprises get lower capital costs, automatic updates and predictive maintenance gleaned from the experiences of thousands of implementations

The Role of Packaging

Consumer product managers have known for a long time that packaging matters. Package labels, shrink-wrap, colors, shapes and materials in bottles, cans, drums, boxes have all made impacts in markets, creating product categories of cookies, candies, detergents and on and on.

In high technology markets, packaging innovation has had a simpler scope, but equally large impact. The availability of inexpensive and high performance industry standard computers and operating systems have attracted software developers interested in controlling more of the operating environment of their application, and thereby packaging their functionality in an 'appliance' form factor or as a hosted 'service'.

Figure 1 – High tech packaging options.



Appliances that integrate processors, memory and data storage with both application and operating system software bring several benefits to customers. Appliances are easy for resellers to source, stock, sell and support and easy for customers to buy, integrate and operate. The appliance is meant to be a complete capability: plug in the power cable and the Ethernet interface(s), configure and go!

Appliances have been accepted by enterprises because they shorten the time to gain the benefits. The complete package means that the customer doesn't have to go through the hassle of qualifying the target computer, sourcing it, waiting for it, testing it, implementing the software and troubleshooting the implementation - and neither does the reseller - since all of this work has already been done by the vendor.

Support and reverse logistics is generally a more pleasant experience for customers since the support organization simply ships a replacement box, the customer or reseller re-initializes the configuration and ships back the defective device. In many cases, the company that assembled and shipped the appliance handles the return and repair without the intervention of the branded software company.

From a characterization perspective, appliances are appropriate for well-behaved software that doesn't require constant innovation or updating to deliver the core functionality. For this reason, applications such as firewalls, routers, traffic accelerators and session border controllers are among the best known and best suited networking appliances.

However, not all applications are suited for appliances.

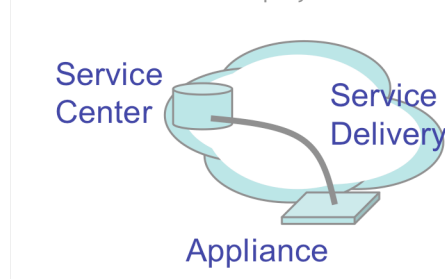
Some applications are best implemented in a **shared service model**. Hosted services are appropriate for applications with an outsized processing demand that would be too expensive to deploy for one enterprise. For example, search engine crawlers are well suited for service functionality because they need enormous processing capacity to scour the billions and billions of web pages and can get the horsepower on demand through the activation of their crawler software on computers shared throughout the content delivery network partners.

Hosted services can be appropriate for software systems that depend on frequent updating of the core functionality. This way the software engineering team of vendors such as email filtering service providers can inject their new code into production without significant network security or logistical challenges since the developer has control of the operations environment.

Service packaging is also appropriate for multi-tenant applications such as VoIP softswitches or sales force automation services so that many enterprises can be served from one implementation. These applications exploit the reach of networks and deliver basic functionality suitable for small locations or small businesses without extensive IT resources to manage an SFA or IP PBX application.

Figure 2 – The three components of the Hardware-as-a-Service model.

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A newly emerging approach is a model that combines some features of appliances with other features of the service model to achieve new value for enterprise customers. This hybrid model, **Hardware-as-a-Service (HaaS)** is suited to applications combining functionality for well-behaved applications with features requiring frequent updates.

The Hardware-as-a-Service Model

Using the three-layered model shown in figure 2 above, the HaaS architecture is a simple, but elegant approach. The best implementations will do more than combine the potentially unlimited shared processing resources of the service center, the rapid frequency and nature of the service delivery with the presence of well understood and controlled access to the processor and special purpose application on the locally deployed appliance. As well, the HaaS implementation, must be more than a leasing option.

Depending on how the functions of the specific implementation might be balanced, this architecture provides an opportunity to recombine functionality to create new levels of value for users. Table 3 below is a comparison highlighting the key advantages of HaaS relative to the service and the appliance implementations.

Table 3 – Comparing packaging options and their tradeoffs.

Feature	Service	Appliance	Hardware-as-a-Service
System Reliability	• High	• Medium	• High
Enterprise Control	• Low	• High	• High
Update Interval	• Short	• Long	• Short
Privacy	• Medium	• High	• High
Critical Performance Factor	• Processors	• Storage I/O	• Both
Scalability	• Unlimited	• Limited	• Limited by appliance
Management	• Portal	• Appliance	• Portal
Examples	<ul style="list-style-type: none"> • Salesforce SFA • CBeyond VoIP • NetSuite Support • Employease HR • Ketera Procurement 	<ul style="list-style-type: none"> • Cisco router • Checkpoint firewall • Ingate SBC • Stampede accelerator • TippingPoint IPS with DigitalVaccine 	<ul style="list-style-type: none"> • Lexmark printers • RedPrarie RFID • Sendio I.C.E. Box Service • Savvis virtual IT services

For HaaS functionality, the customer pays less on initialization than purchasing the typical appliance equivalents, and then typically a monthly fee that includes all upgrades and updates. Some implementations will be extended to include configuration backup or meta data presentation of the operating environment and even proactive operational monitoring to improve service reliability.

Benefits of HaaS include less capital cost, fewer operator interventions and the use of the most up-to-date functionality since the service delivers updates of configuration, logic code or software enhancements rapidly and automatically. At the same time, meta data about operations can be used to monitor appliance operations and identify potential outages or otherwise respond to outages faster than the usual system notification to administrator, administrator troubleshooting and then vendor support request procedures. Proactive response can deliver a higher level of service integrity and operational reliability as well as assure best operating practices are a standard part of the implementation.

Being able to predict service and maintenance problems and respond to them before they become service affecting, are actually plausible within the HaaS architecture since the processing power of the service center can analyze the diagnostics of all appliances - creating a statistical knowledgebase that goes beyond any service or appliance implementations. This is likely to become the primary differentiator for this category of packaging - the ability to leverage the in-production operational experiences of hundreds and thousands of appliances in real-time, and then appropriately respond to the statistics.

Also, the HaaS assures that the enterprise traffic and enterprise data remains private and confidential. Only meta data (data about the data), and operational data is shared with service center, since the enterprise traffic and data are processed locally by the appliance.

Conclusion

As the cost and uniformity of various packaging alternatives continue to fall, the enterprise market will reward innovators that correctly anticipate advances in architectures capable of delivering new levels of value for enterprises. HaaS is one such packaging innovation that will lead to higher levels of increased availability, service quality and deliver unique value leveraging from the experience pool of user implementations.

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