

Magic Quadrant for x86 Server Virtualization Infrastructure

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Summary

About 80% of x86 server workloads are virtualized, but virtualization technologies are becoming more lightweight, supporting more workloads and agile development. Price, modernization and specific use cases are driving enterprises to deploy different, and often multiple, virtualization technologies.

Market Definition/Description

The x86 server virtualization infrastructure market is defined by organizations that are looking for solutions to virtualize applications from their x86 server hardware or OSs, thereby improving server hardware utilization and associated hardware costs while increasing agility in delivering the server capacity that applications need. The x86 server virtualization infrastructure market supports all x86-based workloads (both server and desktop) deployed on standard x86-based physical servers.

Solutions for this market leverage:

Hypervisors to create virtual machines (VMs)

Shared OS virtualization technologies (also called "containers" – see Note 1)

Server hardware and OS virtualization administrative management (base frameworks)

Server hardware and OS virtualization embedded management (live migration and basic automation of administrative management functions)

Not included in the x86 server virtualization infrastructure market are higher-level management functions, such as development automation tools, cluster management technologies, operational automation tools that deal with virtual resources, application performance tools that leverage and monitor virtualization, disaster recovery tools that leverage virtualization, and desktop provisioning and brokering software.

Magic Quadrant

Figure 1. Magic Quadrant for x86 Server Virtualization Infrastructure



Source: Gartner (August 2016)

Vendor Strengths and Cautions

Citrix

The past 12 months highlight Citrix's continuing refinement of its overall strategy. This includes the appointment of a new CEO as well as multiple divestments. While XenServer plays a foundational role in the new strategy, Citrix has now executed a number of fundamental changes. These refocus and reposition XenServer as the underlying platform for several of Citrix's core offerings – rather than for general server workloads.

In desktop virtualization, XenApp and XenDesktop remain widely used. During 2015, Citrix disclosed usage statistics that contradicted prevailing assumptions; it indicated XenServer was the most common platform for Citrix virtual desktops running recent versions (XenDesktop 7.6 and higher). Anecdotal feedback from Gartner clients

continues to suggest these results are reflective of smaller organizations and/or deployments. Irrespective, this is an attractive cost avoidance strategy when comparing XenServer to paid alternatives such as vSphere. In addition, the demand for hyperconverged integrated systems (HCIS) is increasing, with desktop virtualization being a common use case. For XenServer, this has driven expanding partnerships with HCIS vendors such as Atlantis Computing and Nutanix.

For cloud infrastructures, the Xen hypervisor remains the most widely used architecture for public infrastructure as a service (IaaS) cloud providers, if for no other reason than it is used by Amazon Web Services. Citrix also continues to demonstrate its commitment to open source, and actively supports the Linux Foundation's Xen Project. Newer features, such as 64-bit Control Domain (Dom0), have been well-received, as are existing functions such as Provisioning Services.

Early in 2016, Citrix entered into an agreement for Accelerite to acquire the CloudPlatform and CloudPortal products. This removes a point of potential friction for both Citrix and XenServer – relative to OpenStack. It may however reduce the appeal of XenServer to certain cloud infrastructure service providers.

However, and despite the above efforts by Citrix, Gartner inquiries on XenServer remain low (for server workload virtualization). XenServer also lags in certain technical criteria (maximum sizes of virtual memory per guest, virtual disk). Somewhat balancing this, reference customers suggest that the Citrix installed base now appears generally comfortable with the direction of XenServer.

Citrix released XenServer 6.5 in January 2015 (XenServer 7.0 was released after the cutoff for this analysis, and shows improvement against Gartner's current technical criteria).

STRENGTHS

XenServer is a good product offering at zero cost for Citrix workloads. It continues to play a role supporting core Citrix products.

Citrix has a large opportunity in the telecom and cloud service provider markets, which rely heavily on open-source Xen today.

Citrix has a large reseller channel that can be leveraged to sell and deliver infrastructure solutions utilizing XenServer as the underlying platform.

CAUTIONS

Marketing execution and reach are limited for XenServer, while industry perception favors competitors.

Citrix faces open-source software (OSS) competition, including OpenStack's affinity to Kernel-based Virtual Machine (KVM), and it must further develop community and vendor support.

Huawei

Huawei is the world's largest telecom equipment provider by revenue. It started its enterprise business in 2011, and is focused on penetrating into enterprises in Europe and Asia/Pacific. China remains its largest market.

FusionSphere is virtualization infrastructure software, and is part of Huawei's cloud computing and data center infrastructure portfolio. Although it can be supported on third-party hardware, most references are deployed on Huawei's FusionCube.

FusionSphere includes a Xen-based hypervisor, as well as extended input/output, and availability/recovery products and capabilities. Furthermore, Huawei is developing a KVM product suite, which is its stated technology direction.

Huawei FusionSphere first entered the Magic Quadrant for x86 Server Virtualization Infrastructure in 2014. As an up-and-coming product in emerging markets, Huawei FusionSphere claims hundreds of references in emerging economies. It also has references from Western Europe and Singapore, among other mature markets. However, Huawei has more customer references from China than elsewhere. Users of other x86 servers should validate the level of hardware certification and local support for FusionSphere.

In late 2013, Huawei became a Gold Member of the OpenStack Foundation. It has already become a top 10 feature and code contributor, and it is leveraging OpenStack across both FusionCloud and FusionSphere, which may expand its market awareness while also increasing its appeal as cloud infrastructure. As one example, during March 2016 Deutsche Telekom announced Open Telekom Cloud, engineered by Huawei and operated by T-Systems.

Huawei has established its position in telecommunications companies and for networking technology. During the past few years, Huawei has shown great ambition to expand into enterprise markets in mature economies. However, national security concerns have resulted in obstacles, mainly in North America. Its continuing growth will likely originate from emerging markets, particularly Asia/Pacific and Europe – where FusionCloud and FusionSphere are being evaluated in test/development and in pilots for cloud infrastructure.

STRENGTHS

Huawei provides an increasing breadth of product sets tied to FusionSphere and FusionCloud, leveraging open source and OpenStack. It has a complete infrastructure stack in terms of server hardware and virtualization software.

Huawei is an integrated provider across carriers, consumer and enterprise markets.

Huawei is a disruptive alternative vendor with good momentum in emerging countries and parts of Europe.

CAUTIONS

Huawei is challenged in North America and some mature markets that are sensitive to geopolitical issues. It has only a few partnerships with third-party vendors outside of China, and lacks a cohesive channel ecosystem to serve enterprise customers.

Execution is strongest in select geographies and vertical-industry markets (telecommunications and Huawei's selected large accounts).

Microsoft

Microsoft's last update to Hyper-V was Windows Server 2012 R2, delivered in October 2013. This was a solid release that has helped Microsoft grow market share (which is still well-behind market leader VMware). While price continues to favor Hyper-V, customers report four important gaps between Hyper-V and VMware's vSphere: longer planned downtime due to the size of the parent operating system; operational complexity and failover issues with high availability (HA); complex automation of live migration with Dynamic Optimization; and lack of a proven vendor-supplied alternative to VMware's Site Recovery Manager (SRM). Microsoft has plans to make progress in each of those areas in Windows Server 2016 (coming later in 2016), which will change the competitive dynamic over the next year. For now, Microsoft has been able to capture new business, but has struggled to convert existing VMware users.

Microsoft's efforts in enabling Azure-like capability have been attracting enterprises interested in leveraging Azure, and managing both on-premises Hyper-V and Azure services (Microsoft plans to release Azure Stack in late 2016 to improve affinity even further). This has helped to maintain a growing interest in using Hyper-V for Microsoft-based development teams. Combined with its strategy to support containers in Windows Server 2016, Microsoft's vision for virtualization continues to expand – especially for developers. Its focus on developers is important in an infrastructure virtualization market that is heavily saturated.

While it is converting very few VMware customers, Microsoft is successfully "surrounding" VMware data center deployments with its own deployments in development teams, branch offices, stores and remote data centers (usually a small percentage, but a presence, nonetheless). According to surveys, nearly half of large enterprises report that they have multiple hypervisor technologies, and Hyper-V is the most common second choice.

STRENGTHS

There is a large installed base of Windows Servers and a large number of Windows-only enterprises.

Microsoft's virtualization products are offered at a low price, especially for existing Windows Server customers and small and midsize enterprises.

Hyper-V and System Center have a growing interoperability and integration with Azure, which especially attracts developers, but also those interested in the rest of the Microsoft cloud portfolio.

CAUTIONS

Microsoft will find it difficult to convert the entrenched VMware installed base, especially in large enterprises.

While improving, Microsoft lacks a few key capabilities important to large-scale virtualization customers.

Microsoft faces growing competition with open-source-based solutions and cloud providers.

Oracle

While the x86 virtualization market continues to grow, general interest in Oracle VM Server for x86 (OVM) has remained low with Gartner customers (based on inquiries and client meetings). Oracle is focused on an application-driven virtualization strategy that goes beyond the hypervisor to provide full integration across the Oracle software portfolio. This integration is driving a strong execution in the Niche Players quadrant.

Gartner continues to receive inquiries from clients considering alternative hypervisors (such as Oracle VM) due to Oracle application certification, license and support issues. Clients report that difficulties around live migration and storage recovery have generally been resolved. This has been tied to improvements in both Oracle VM and Oracle Linux as they are integrated within Engineered Systems. However processor pinning – due to Oracle license concerns – also restricts OVM in a VM cluster, reducing the technical agility due to commercial restrictions.

Oracle offers a range of virtualization technologies, from hypervisor- to container-based. Oracle VM is Oracle's implementation of the Xen v.4.4 hypervisor, which leverages intellectual property tied to Oracle Linux. Oracle has further integrated these technologies into a more coherent and packaged solution with the Oracle VM 3.4 release, tied to OpenStack cloud management; it offers more integration to an all-Oracle solution, as well as heterogeneous support. Oracle VM is managed by Enterprise Manager 13c, Oracle's system management product. Enterprise Manager can monitor and manage the entire stack – from applications to infrastructure – allowing application and platform administrators to get contextual insight into their virtualization environment. Enterprise Manager 13c also acts as the service delivery platform for cloud services, leveraging the infrastructure and virtualization resources provided by Oracle's VM product portfolio. This portfolio includes Oracle VM Server for x86, Oracle VM Server for SPARC (based on Sun Logical Domain [LDOM] technology), Oracle Solaris Zones, Oracle Linux Containers, storage and other related virtualized infrastructures. This management unification is an important foundation for Oracle virtualization and builds an integrated approach to selling virtualized DBMSs (including

Oracle Real Application Clusters [RAC]), Oracle WebLogic Server and other Oracle software solutions, as well as attached storage with Oracle-based management solutions including embedment into Oracle's Engineered Systems such as Exadata and Exalogic, which now both ship with OVM.

Most customer references that Gartner talked to stated that certification and licensing remain the primary reasons for choosing Oracle VM. While Oracle now certifies its software on Hyper-V, Oracle still favors Oracle VM for software licensing and pricing. For example, Oracle supports processor pinning only for OVM (specifying a limited number of processors being used by a VM), which can reduce software costs that are licensed to the VM cluster, virtual input/output (I/O) or networked storage. This approach and flexibility do not extend to the Hyper-V certification.

Oracle Solaris Zones offers shared OS virtualization capabilities for tactical x86 deployments (the same capabilities as provided on the SPARC platform, although, by definition, that is out of scope for this market evaluation). All zones and container technologies provide differentiated benefits for x86 Oracle users – higher virtualization density and reduced operational costs due to fewer OS instances, something that hypervisor-based solutions cannot do. In this case, Oracle Solaris Zones alongside Oracle VM can be a complementary solution, targeted at different application requirements. Solaris Zones also contains a new Solaris-optimized virtualization layer that allows for the flexibility of a Type 2 hypervisor that is optimized to run Solaris as a guest, allowing the expansion for bimodal use.

STRENGTHS

Oracle provides preferential licensing and certification of Oracle software using Oracle VM and improved interoperability with Microsoft.

Oracle has a large overall software installed base and financial strength, allowing it to test and tune the hypervisor for optimal application performance, including VM templates for Oracle Linux, Oracle DBMS, Oracle RAC and Oracle applications.

Oracle Solaris Zones and Oracle Linux Containers complement Oracle VM as lightweight alternatives to a hypervisor – only for Solaris and Linux deployments.

CAUTIONS

Gartner client interactions regarding Oracle VM and Oracle Linux have remained low in the past year.

Oracle's push for an Oracle-only stack limits its general market potential.

The third-party ecosystem for Oracle virtualization is smaller than that of the market leaders.

Red Hat

Red Hat has entered the Visionaries quadrant, primarily due to a strong tie between KVM adoption and OpenStack, as well as an increase in OpenStack adoption and integration. In Red Hat Enterprise Virtualization (RHEV) 3.6 (released March 2015), Red Hat added both the OpenStack Glance project (for disk and server image management) and the OpenStack Neutron networking project. For this assessment, we reviewed RHEV 3.5 from February 2015.

OpenStack is not necessarily a sure thing for Red Hat, nor is it Red Hat's only strategy. At the OS layer, Red Hat competes with Ubuntu Server, CentOS and others. At the hypervisor layer, RHEV's primary competitor still appears to be open-source KVM. With a relatively undervirtualized Red Hat Enterprise Linux (RHEL) market, and a growth in OpenStack, Red Hat has potential opportunity.

Licensing and packaging of Red Hat's virtualization offerings are being streamlined, which can only serve to increase interest. This includes more suite-based offerings aimed at Linux-based workloads, as well as heterogeneous management of cloud and virtual infrastructure (using CloudForms).

Red Hat's virtualization strategy should be to continue as an alternative to both VMware and Microsoft, especially in the RHEL installed base and where there is concern over lock-in and/or interest in a more heterogeneous approach. The key will be improved execution at the same time that VMware and Microsoft are investing heavily in their own solutions that extend from virtualization to cloud infrastructures, IaaS and platform as a service (PaaS).

Similar to Microsoft, Red Hat's success cannot depend upon displacing VMware or only penetrating customers that have yet to virtualize. Red Hat must successfully deliver the right virtualization stack for the right applications – especially for Linux-based development and Mode 2 applications.

RHEL customers remain the prime target – just as Windows Server is for Microsoft. For private clouds, Red Hat can promote an alternative to VMware: OpenStack-based private cloud architecture for new, cloud-aware applications and new development/test. One of Red Hat's biggest competitors will be open-source-based solutions. However, as interest in OpenStack grows, interest in vendor support and more turnkey solutions will also grow. Improved execution will be critical for Red Hat to overcome significant marketing by VMware and Microsoft.

Enterprises interested in OpenStack but looking for faster time to value should consider Red Hat as a visionary option – but also should require a rapid return on investment (two to three years), with the potential for changing technologies at the end of that time frame.

STRENGTHS

Red Hat has a loyal RHEL customer base and bimodal opportunity (much of which

can virtualize using hypervisors or containers).

CloudForms offers enterprises a heterogeneous management layer for virtual and cloud infrastructure.

Red Hat leads the core KVM OSS development community and has increased its interoperability with Microsoft, which allows it to span both commercial and open-source software environments.

CAUTIONS

Red Hat has achieved only limited success in sales and marketing execution for virtualization, partly due to strong competition from OSS alternatives.

The majority of Red Hat's virtualized RHEL instances run on VMware, which is difficult to displace as embedded infrastructure.

While Red Hat is successful with selling RHEL, it is more challenged upselling RHEV and other layered software.

Sangfor

Sangfor provides network security, network optimization and virtualization solutions. Having developed a secure remote access solution, Sangfor launched its virtual desktop infrastructure (VDI) in late 2013 and its x86 server virtualization infrastructure in early 2015. This year is Sangfor's first year in the Magic Quadrant for x86 server virtualization infrastructure.

Based on open-source technologies, notably KVM, Sangfor's virtualization offering continues to expand and now includes virtual storage and hyperconverged integrated systems through its hardware relationships, including with Lenovo and Inspur. It has also developed relationships with thin-client hardware suppliers in China. With its core competencies in security and networking, Sangfor is primarily known for application delivery.

Sangfor is headquartered in Shenzhen, China. The majority of its revenue is currently generated domestically, and it has over 2,800 employees. Reference customers from China highlight Sangfor's support and technical expertise, as well as its suitability to meet government requirements in support of domestic providers. All of the Sangfor references for this Magic Quadrant had only begun using Sangfor virtualization products during the past 12 months, reflective of China's later adoption of x86-based virtualization.

In terms of global presence, Sangfor is in the process of trying to expand. It has international offices in Hong Kong, Southeast Asia, the U.K. and the U.S. Support for English language was added in version 4.2 (November 2015). However, the majority of its existing customers are based in mainland China today, making it a key competitor in that market only.

Sangfor released version 5.0 in May 2016, which was after the cutoff for this analysis.

STRENGTHS

Sangfor has an established reputation and business in security and networking.

The company is positioned for expanding demand for server virtualization within the domestic China market.

Sangfor's expanded offering now includes HCIS.

CAUTIONS

There is limited support for non-Chinese languages in the current version of its offering.

Sangfor has limited support and sales presence outside of China.

All reference customers had limited production experience (six to 12 months).

Virtuozzo

In March 2015, Parallels divided its company more explicitly into two distinct brands and business divisions – Parallels for the cross-platform solutions (focused on end-user support and application delivery) and Odin (focused on service providers, for hosting and cloud automation, web management, and cloud infrastructure). In December 2015, Odin Service Automation was sold to Ingram Micro, and Virtuozzo was spun out as a separate company focused exclusively on containers and virtualization technologies (system containers, KVM-based hypervisor, storage virtualization and virtualization administration tools). Virtuozzo targets service providers that serve small- or midsize-business customers – a loyal, viable and expanding community for the company. Additionally, Virtuozzo is the major driving force behind OpenVZ and has been working closely with Docker and Google on container standards. Virtuozzo has the potential to expand its service provider value and market reach – given its track record (with millions of container instances deployed) and new compatibility with Docker.

Virtuozzo allows applications to run in lightweight, separate system containers, offering processor affinity and memory protection and isolation. Compared with hypervisor-based solutions, the Virtuozzo container offering enables much higher server densities, and can reduce OS software and administration costs. Virtuozzo containers also offer portability and live workload migration. The whole architecture of containers enables a workload and container to spin up faster and with less performance overhead than VM solutions. For those customers who prefer to manage their own OSs, Virtuozzo's KVM-based hypervisor enables service providers to offer traditional VMs on the same physical node as containers. Virtuozzo Storage enables a complete high-availability solution on commodity hardware by creating a cloud storage pool from existing server hard drives.

Virtuozzo is positioned for service providers that are competing with hyperscale providers for midmarket enterprise customers. Virtuozzo is used on-premises by only a handful of large enterprises, but it sees potential to expand its enterprise adoption through OEM and alliance partnerships. Virtuozzo is also focused on the growing market for SaaS vendors using Virtuozzo for their infrastructure.

Virtuozzo offers the best solution for service providers building high-density and isolated solutions around common persistent workloads, such as web services and databases. As the Docker and container phenomenon grows, Virtuozzo has a head start on competitors. However, as every major cloud provider begins to offer container support, and as every major hypervisor vendor adds container support to its portfolio, Virtuozzo will be challenged to maintain a lead.

STRENGTHS

Virtuozzo has deep and proven experience in robust container and container management technology.

Virtuozzo has a large and committed service provider installed base.

The strong mix of containers, a hypervisor, storage virtualization and cloud management offer service providers a low-cost high-performance alternative.

CAUTIONS

The re-emergence of the container market will also create competitive challenges for Virtuozzo, as providers and virtualization vendors invest heavily in alternate container technologies.

Virtuozzo's focus on service providers limits its hybrid cloud adoption by enterprises (except through Docker interoperability).

Virtuozzo relies on a service provider market that is under extreme price pressure from very large cloud providers.

VMware

VMware has maintained its functionality lead, introducing vSphere 6.0 in early 2015. VMware continues to have dominant installed base market share, and customers remain very satisfied with product capabilities and vendor support. However, concern over price and vendor lock-in remains. As the market share leader, VMware is affected the most by a virtualization slowdown due to market saturation (near 80%), and the rapid growth of cloud computing as an alternative (with the majority of new VMs now being deployed by cloud providers rather than on-premises). Unlike Microsoft, VMware is also challenged by its lack of influence with developers. VMware growth has been slowing, and there are strong signs that, as a market, server virtualization has passed its peak. Client inquiries have been significantly increasing about comparisons between VMware and Hyper-V, specifically. While few large enterprises are switching, some smaller enterprises that are not far along in their virtualization deployment are

switching (often from VMware to Hyper-V, but sometimes from Hyper-V to VMware), and some larger customers are deploying alternatives to VMware in separate data centers or in branch/store locations. Microsoft's Windows Server 2016 release is slated for 2016, which may reduce the functionality gap with VMware.

An emerging concern is the rapid growth of IaaS cloud providers, especially Amazon Web Services (based on Xen), used mainly for new workloads that are designed for cloud computing. While VMware has a dominant share for existing enterprise workloads, its share of the newer, cloud workloads is much smaller – a major inhibitor to growth. About 15% of all VMs are now deployed by cloud providers – a big change from their 3% share in 2011. VMware's vCloud Air cloud service remains a tiny competitor in this market, and the vCloud Air Network of service providers combined has a very small share that are using VMware technology. This has motivated VMware to embrace a multicloud approach.

VMware has launched a two-pronged effort to target cloud-native developers – vSphere Integrated OpenStack in mid-2014, and the Photon Platform in mid-2015. VMware is also focusing more on integration and positioning with Pivotal (which it divested in 2012). However, VMware's success with developers – especially for on-premises cloud-native applications – remains a key challenge.

STRENGTHS

VMware dominates the virtualization and infrastructure market for on-premises, traditional applications with a large ecosystem of ISV/IHV partners.

VMware is a virtualization technology leader, with significant investments and innovation.

VMware receives high customer satisfaction from a large installed base.

CAUTIONS

The cost of VMware offerings tends to be high, and competition is closing the functionality gap.

The on-premises virtualization market has peaked, significantly challenging VMware's business model and historical growth.

VMware has a limited influence with developers, limited presence among cloud providers, and is challenged to gain a foothold with cloud-native applications in general.

Vendors Added and Dropped

We review and adjust our inclusion criteria for Magic Quadrants as markets change. As a result of these adjustments, the mix of vendors in any Magic Quadrant may change over time. A vendor's appearance in a Magic Quadrant one year and not the next does

not necessarily indicate that we have changed our opinion of that vendor. It may be a reflection of a change in the market and, therefore, changed evaluation criteria, or of a change of focus by that vendor.

Added

Sangfor was added.

Odin changed its name to Virtuozzo.

Dropped

No vendors were dropped.

Inclusion and Exclusion Criteria

Vendors that were eligible for inclusion in this Magic Quadrant met the following criteria:

It must provide x86-server-based solutions to virtualize applications from OSs, or OSs from x86 server hardware, using either hypervisors or container technology.

It must provide basic administrative tools for:

Administrative management frameworks/suites for hypervisors/containers

Embedded virtualization management technology (such as live migration)

It must have at least 100 organizations using its generally available products as of 1 March 2016.

Open-Source Software Considerations

Magic Quadrants are used to evaluate the commercial sales execution, vision, marketing and support of products within markets, which excludes evaluation of full open-source software (OSS). The x86 server virtualization infrastructure Magic Quadrant includes only commercial-vendor-based offerings, and it does not include individual positions and evaluations for OSS projects, such as Xen, KVM, OpenVZ or Linux Containers (LXC). These are valid alternatives to commercial software, but are not effectively evaluated in Magic Quadrants, which focus on many vendor-specific attributes. However, there are commercial versions of OSS that are evaluated — for example, Xen (Citrix, Oracle VM), KVM (Huawei, Red Hat, Sangfor) and OpenVZ (Virtuozzo).

External service providers, startups and entrepreneurs who have the necessary in-house skills can use open source to develop, test, configure, build and maintain their own environments. Cloud service providers (such as Amazon and Google) are more likely to have the technical skills and to shave margins in their services and product offerings to keep costs low, and they will likely develop and deploy their automation tools on a license-free OSS version of the hypervisor. Today, more than 90% of those

OSS virtualization instances are deployed in the cloud – especially on Amazon Web Services (which uses a variant of Xen). We also see OpenStack efforts in enterprises often using open-source technologies (especially KVM) rather than vendor distributions.

Users have the choice of selecting either vendor-specific implementations of virtualization or OSS-community-supported projects. The self-maintenance and integration approach avoids subscription support licenses and vendor dependencies, but it will add to internal support costs if skills are minimal or infrastructures are poorly implemented, resulting in more frequent outages and downtime.

Evaluation Criteria

Ability to Execute

We evaluated technology providers on the quality and efficacy of the processes, systems, methods and procedures that enable IT provider performance to be competitive, efficient and effective, and to positively affect revenue, retention and reputation. Ultimately, technology providers are judged on their ability and success in capitalizing on their vision.

Ability to Execute in server virtualization is not simply about product features, but also about maintaining a constantly changing business model in a dynamic trend. Good products could fail, and poor products could be successful, based on effective vendor execution. Challenges today include increasing market saturation; HCIS and cloud IaaS as alternatives; a growing trend toward agile development; and applications designed toward a microservice architecture.

Product or Service: This criterion includes the core goods and services offered by the technology providers that compete in/serve the defined market. This criterion also includes current product/service capabilities, quality, feature sets and skills, whether offered natively or through OEM agreements/partnerships. Key factors that are evaluated include the range of OSs and applications supported; scalability and efficiency; elasticity; maturity; embedded resource management; management features to reduce administrative burden; ability to administer the holistic, virtualized ecosystem; administrative scalability; and integration with third-party enterprise management providers. Feature/function checklists are not sufficient – real customer use matters, as does ease of use.

Overall Viability: Viability includes an assessment of the overall organization's financial health, the financial and practical success of the business unit, and the likelihood of the individual business unit to continue to invest in the product, continue offering the product and advance the state of the art within the organization's portfolio of products.

Sales Execution/Pricing: This criterion covers the technology provider's capabilities in all presales activities, and the structure that supports them. This includes deal management, pricing and negotiation, presales support, and the overall effectiveness of the sales channel. Customers are enterprises and service providers. In a market that continues to grow significantly every year, share growth is more important than volume growth.

Market Responsiveness/Record: This criterion examines the provider's ability to respond, change direction, be flexible and achieve competitive success as opportunities develop, competitors act, customer needs evolve and market dynamics change. This criterion also considers the provider's history of responsiveness.

Marketing Execution: This criterion evaluates the clarity, quality, creativity and efficacy of programs designed to deliver the organization's message to influence the market, promote the brand and business, increase awareness of the products, and establish a positive identification of the product/brand and organization in the minds of buyers. This mind share can be driven by a combination of publicity, promotions, thought leadership, word of mouth and sales activities.

Customer Experience: This criterion considers the relationships, products and services/programs that enable clients to be successful with the products evaluated. Specifically, this criterion includes the ways customers receive technical or account support. It can also include ancillary tools, customer support programs (and the quality thereof), the availability of user groups and SLAs.

Operations: This criterion evaluates the ability of the organization to meet its goals and commitments. Factors include the quality of the organizational structure, such as skills, experiences, programs, systems and other vehicles that enable the organization to operate effectively and efficiently on an ongoing basis.

Table 1. Ability to Execute Evaluation Criteria

| Evaluation Criteria | Weighting |
|------------------------------|-----------|
| Product or Service | High |
| Overall Viability | High |
| Sales Execution/Pricing | High |
| Market Responsiveness/Record | Low |
| Marketing Execution | High |

| Evaluation Criteria | Weighting |
|---------------------|-----------|
| Customer Experience | Medium |
| Operations | Low |

Source: Gartner (August 2016)

Completeness of Vision

We evaluated technology providers on their ability to convincingly articulate logical statements about current and future market direction, innovation, customer needs and competitive forces, and how well they map to the Gartner position.

In the server virtualization market, vendor understanding and articulation of the strategic path for virtualization — expanding into the foundation for the future infrastructure architecture and operations, extending toward cloud computing, and enabling interoperability with third-party providers — are particularly important and differentiating. As agile development methodologies, digital business and demand for more real-time scalability grow in importance, vendors' visions for rapid provisioning, rapid scalability and developer ease of use are becoming important. Container use is expected to grow, and virtualization vendors will need to have strategies that accommodate or leverage container technologies.

Market Understanding: This criterion evaluates the technology provider's ability to understand buyers' needs and to translate those needs into products and services. Vendors that show the highest degree of vision listen to and understand buyers' wants and needs, and they can shape or enhance those wants with their added vision. The market includes enterprises with their own strategies to build private and hybrid cloud solutions, as well as cloud computing providers.

Marketing Strategy: This criterion includes a clear, differentiated set of messages consistently communicated throughout the organization and externalized through the website, advertising, customer programs and positioning statements.

Sales Strategy: This criterion considers the strategy for selling products that uses the appropriate network of direct and indirect sales, marketing, service, and communications affiliates to extend the scope and depth of market reach, skills, expertise, technologies, services and the customer base.

Offering (Product) Strategy: This criterion includes a technology provider's approach to product development and delivery that emphasizes differentiation, functionality, methodology and feature set as they map to current and future requirements. Interoperability between enterprises and service providers (and between providers) is also growing in importance.

Business Model: This criterion includes the soundness and logic of a technology provider's underlying strategic business proposition. With virtualization, the business model might be for the virtualization technology itself, or virtualization might be an enabler for a related business.

Vertical/Industry Strategy: This criterion considers the technology provider's strategy to direct resources, skills and offerings to meet the specific needs of individual market segments, including verticals (enterprises and service providers).

Innovation: This criterion evaluates the direct, related, complementary and synergistic layouts of resources, expertise or capital for investment, consolidation, or defensive or pre-emptive purposes.

Geographic Strategy: This criterion refers to the technology provider's strategy to direct resources, skills and offerings to meet the specific needs of geographies outside the native geography, either directly or through partners, channels and subsidiaries, as appropriate for the geography and market.

Table 2. Completeness of Vision Evaluation Criteria

| Evaluation Criteria | Weighting |
|-----------------------------|-----------|
| Market Understanding | High |
| Marketing Strategy | High |
| Sales Strategy | Medium |
| Offering (Product) Strategy | Medium |
| Business Model | Medium |
| Vertical/Industry Strategy | Medium |
| Innovation | Medium |
| Geographic Strategy | Low |

Source: Gartner (August 2016)

Quadrant Descriptions

Leaders

Leaders in this market have a clear strategy and roadmap for their offerings, understand virtualization's role in infrastructure and operations transformation, and have a clear vision with respect to private cloud, hybrid cloud and public cloud computing (in terms of the role of virtualization). Leaders focus on the needs of infrastructure and operations, and also on developers for virtualization technologies and capabilities. Most importantly, they have a strategy to communicate their vision to their market and are executing well from a sales and market share perspective.

Microsoft and VMware remain in the Leaders quadrant in 2016. Microsoft's Azure (cloud) strategy, and affinity with on-premises Hyper-V is becoming more important (especially for developers), while both VMware and Microsoft have aggressive strategies to accommodate container technologies. While VMware retains strong installed base market share, Microsoft has a stronger story for new applications, and is reducing the functionality gap.

Challengers

Challengers in this market have a strong Ability to Execute, but have a more focused marketing or product vision. In 2016, there are no clear Challengers in this market, just Visionaries and Niche Players.

Visionaries

Visionaries in the x86 server virtualization infrastructure market have a differentiated approach or product, but they aren't meeting their potential from an execution standpoint. Red Hat is the Visionary in this Magic Quadrant, based on its rich cloud software stack, its strength with OpenStack, and its role in driving container technologies.

Niche Players

Server virtualization is a broad market, and Niche Players in this market either have not yet capitalized on their opportunity or are focused on specific niches where they can be successful versus competitors that have a more general approach. Oracle remains successful in Oracle-only stacks. Virtuozzo remains as a Niche Player in this market, with a container strategy that could move it toward the Visionaries quadrant. Virtuozzo continues to be a strong and improving choice for service providers focused on high-density deployments of specific applications, especially targeting small or midsize businesses; and it has reasonable plans to expand its base over time – especially pertaining to a mature container-based offering. Huawei's solution is beginning to mature, and more customers are leveraging its capabilities (especially service providers). Sangfor is another example of the unique characteristics of the China market. Citrix remains a Niche Player, solidifying its renewed focus, with continuing strength in the VDI use case.

Context

About 80% of x86 architecture workloads have been virtualized on servers. The vast majority is virtualized in virtual machines, but containers are growing as a virtualization option, driven by easy-to-use developer frameworks, container standards, microservice application demands and cloud computing in general. The IaaS cloud computing market is growing 60% to 70% annually, with about 15% of all VMs now delivered through public cloud IaaS providers (up from 3% in 2011), and the majority of new VMs were deployed in the public cloud (rather than on-premises) in 2015. Most of the VMs in the public cloud are used for net-new workloads – but as container offerings increase, containers will become the popular alternative for VMs in the cloud. HCIS are forecast to grow to over 30% of all integrated systems by 2020. In the enterprise segment, where the vast majority of workloads are existing/legacy, saturation (and the slower growth of traditional applications) is slowing the market. The demand for agile development and cloud-enabled applications will drive lighter-weight VM, OS and container technologies. The majority of containers will be deployed on VMs, however, so whether in the cloud or on-premises, technologies that improve VM and container synergy and manageability will become increasingly important over the next few years.

The private cloud market is maturing, with most enterprises opting to focus on virtualization automation and modernization (also called "cloud-inspired infrastructure"), or beginning to leverage third-party managed services or hosted offerings. Leading-edge adopters are building true private clouds on-premises, but often based on open-source virtualization – and container technology will become heavily used here during the next few years. Most enterprises are realizing that they will be leveraging multiple architectures – through multiple cloud providers and on-premises – with purpose-built solutions driving multiple virtualization architectures. A minority of large enterprises is only leveraging a single virtualization technology today, and that percentage will continue to shrink. Pricing remains a concern, but specific use cases and cloud interoperability are growing factors in virtualization decisions.

Market Overview

The x86 server virtualization infrastructure market is the foundation for two extremely important market trends that relate and overlap: infrastructure modernization and cloud computing. For infrastructure modernization, virtualization is used to improve resource utilization, reduce costs, improve energy efficiency, improve the speed of resource delivery and encapsulate workload images in a way that enables automation. Virtualization is a horizontal trend in this sense, with the vast majority of enterprises and workloads eventually becoming virtualized. Cloud computing is a more specific style of computing that will be applicable to specific workloads – especially those that require agility of provisioning and/or scaling. The cloud computing trend is promoting an evolution in virtualization technologies to become more lightweight, enabling even

more agility in application design, development, deployment and scaling. Container technologies are re-emerging as a growing trend in virtualization due to the demand for better agility.

Virtualization (in the form of VMs and containers) is a fundamental enabler to IaaS, and it will be used to establish private cloud services, public cloud services and interoperable hybrid cloud services. Effectively, all IaaS offerings will rely on VMs or container technology. In the past year, the installed base of server virtual containers and VMs continued to grow; however, the enterprise market is slowing down due to increasing market saturation, while the IaaS market is expanding rapidly (now accounting for about 15% of all existing VMs). Virtualization enables faster provisioning and deprovisioning, increasing the growth of workload deployments and offsetting saturation somewhat – but there is much more growth taking place in public cloud providers, driven by new, agile, cloud-enabled workloads. At the same time, the flexibility and low barrier to entry that virtualization and IaaS create are decreasing the average life span of workloads.

A large percentage of server VMs are now VDI VMs (although they tend to be consolidated at a much higher density, resulting in fewer server licenses). Most enterprises are focusing on-premises virtualization efforts on the more complex, Tier 1 workloads. Based on Gartner's 2015 Cloud Adoption Survey, 42% of enterprises said they have already deployed an internal private cloud. However, based on the survey, only 7% of enterprises have true private clouds (with self-service, full automation and usage metering). The majority is focused on higher levels of virtualization automation – supporting all or most of their existing applications, and focused on infrastructure modernization. Also, as third-party options for private cloud computing grow, enterprises are considering outside help or outside deployments. Questions on evaluating alternative choices for x86 server virtualization infrastructure are increasing as the market becomes more competitive; however, VMware and Microsoft stand out as the clear mainstream leaders. Price, functionality, use cases, cloud interoperability and developer enablement are significant factors in selection.

The majority of large enterprises are heavily virtualized, and few are considering changing their existing virtualization technologies. However, a growing percentage of them have or are planning to have multiple virtualization technology silos, each managed with its own administrative solutions and skills (which may reduce software expense, but which also increases overall operational cost and complexity). This trend is congruent with the trend toward bimodal IT – managing different application types with different technologies and different operational models. Many smaller enterprises and those in emerging economies are still early in their virtualization effort. These enterprises have several viable alternatives from which to choose.

Note 1

Containers and Docker

While containers (also called shared OS technologies) are included in this Magic Quadrant, the container market is rapidly changing. Originally, with Virtuozzo and Solaris Zones, containers were used in ways similar to virtual machines – primarily for greater density of workloads. Through easy-to-use tools like Docker, and standards work in Linux virtualization technologies, containers have shifted to become developer tools, for ease of use, packaging and portability, and rapid provisioning and scale-out. This use of containers represents an essentially new market, and a new ecosystem of technologies to enable, orchestrate and manage it. Gartner will be modifying our market definitions over the next year or two to accommodate these changes. This year, we continue to include containers primarily as technologies used (and managed) by infrastructure and operations customers, rather than containers and container tools used by developers. For example, the Docker framework is a developer-facing technology that leverages operating system virtualization capabilities (in Linux, and in the future, in Windows) – so we are not including Docker itself in this Magic Quadrant.

Evaluation Criteria Definitions

Ability to Execute

Product/Service: Core goods and services offered by the vendor for the defined market. This includes current product/service capabilities, quality, feature sets, skills and so on, whether offered natively or through OEM agreements/partnerships as defined in the market definition and detailed in the subcriteria.

Overall Viability: Viability includes an assessment of the overall organization's financial health, the financial and practical success of the business unit, and the likelihood that the individual business unit will continue investing in the product, will continue offering the product and will advance the state of the art within the organization's portfolio of products.

Sales Execution/Pricing: The vendor's capabilities in all presales activities and the structure that supports them. This includes deal management, pricing and negotiation, presales support, and the overall effectiveness of the sales channel.

Market Responsiveness/Record: Ability to respond, change direction, be flexible and achieve competitive success as opportunities develop, competitors act, customer needs evolve and market dynamics change. This criterion also considers the vendor's history of responsiveness.

Marketing Execution: The clarity, quality, creativity and efficacy of programs designed to deliver the organization's message to influence the market, promote the brand and business, increase awareness of the products, and establish a positive identification with the product/brand and organization in the minds of buyers. This "mind share" can be driven by a combination of publicity, promotional initiatives, thought leadership, word of mouth and sales activities.

Customer Experience: Relationships, products and services/programs that enable clients to be successful with the products evaluated. Specifically, this includes the ways customers receive technical support or account support. This can also include ancillary tools, customer support programs (and the quality thereof), availability of user groups, service-level agreements and so on.

Operations: The ability of the organization to meet its goals and commitments. Factors include the quality of the organizational structure, including skills, experiences, programs, systems and other vehicles that enable the organization to operate effectively and efficiently on an ongoing basis.

Completeness of Vision

Market Understanding: Ability of the vendor to understand buyers' wants and needs and to translate those into products and services. Vendors that show the highest degree of vision listen to and understand buyers' wants and needs, and can shape or enhance those with their added vision.

Marketing Strategy: A clear, differentiated set of messages consistently communicated throughout the organization and externalized through the website, advertising, customer programs and positioning statements.

Sales Strategy: The strategy for selling products that uses the appropriate network of direct and indirect sales, marketing, service, and communication affiliates that extend the scope and depth of market reach, skills, expertise, technologies, services and the customer base.

Offering (Product) Strategy: The vendor's approach to product development and delivery that emphasizes differentiation, functionality, methodology and feature sets as they map to current and future requirements.

Business Model: The soundness and logic of the vendor's underlying business proposition.

Vertical/Industry Strategy: The vendor's strategy to direct resources, skills and offerings to meet the specific needs of individual market segments, including vertical markets.

Innovation: Direct, related, complementary and synergistic layouts of resources, expertise or capital for investment, consolidation, defensive or pre-emptive purposes.

Geographic Strategy: The vendor's strategy to direct resources, skills and offerings to meet the specific needs of geographies outside the "home" or native geography, either directly or through partners, channels and subsidiaries as appropriate for that geography and market.



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