

Magic Quadrant for x86 Server Virtualization Infrastructure

Gartner RAS Core Research Note G00200526, Thomas J. Bittman, Philip Dawson, George J. Weiss, 26 May 2010, RA406042011

Server virtualization for x86 architecture servers is one of the hottest trends in IT today, and will remain so for several years. Competition is maturing, and the market has a number of viable choices.

WHAT YOU NEED TO KNOW

This document was revised on 27 May 2010. For more information, see the Corrections page on gartner.com.

Virtualization of x86 architecture servers has been an extremely dynamic market (and a major trend) since VMware introduced its server products in 2001. For several years, competition was very limited. However, since 2006 (with the first commercial versions of Xen) and 2008 (with the release of Microsoft's Hyper-V), very viable alternative choices have emerged. Initially used just for cost reduction, server virtualization is now also being used to speed up operational processes and server deployment, create disaster recovery solutions where they didn't exist before, and improve server availability. x86 architecture server virtualization is now considered a mainstream trend (roughly 25% of the market is penetrated), and the strategic path from server virtualization to cloud computing is becoming more apparent to enterprises.

MAGIC QUADRANT

Market Overview

The x86 server virtualization infrastructure market is a foundation for two extremely important market trends: infrastructure modernization and cloud computing. For infrastructure modernization, virtualization is being used to improve resource utilization, improve the speed of resource delivery and encapsulate workload images in a way that enables automation. The effect of virtualization is also to further abstract the implementation details from users, helping IT organizations along the path to becoming service providers to their business customers (rather than being equipment hosters). Virtualization is enabling a fundamental change in how enterprises manage, deploy and deliver IT.

Virtualization is also a foundation for cloud-computing providers that are providing infrastructure as a service. Providers such as Amazon, GoGrid, GoDaddy.com and Terremark Worldwide are using virtual machines or containers as the foundation of their cloud-computing services.

Finally, virtualization will also be used to migrate workloads to and from enterprises and external service providers.

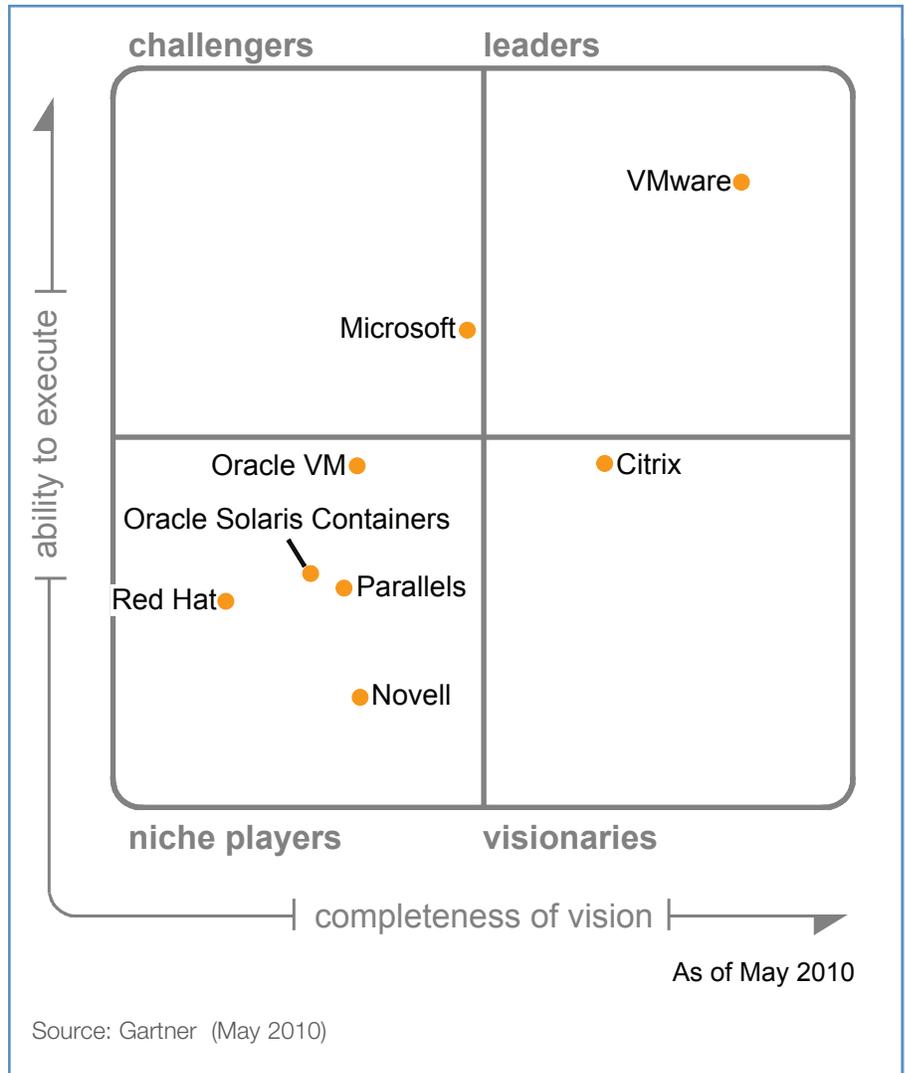
x86 server virtualization infrastructure provides the foundation for new management and automation tools, new security architectures, and new processes. Although the technologies in the x86 server virtualization infrastructure market are simply enablers, these technologies will be used by vendors to drive customers to higher-level management and automation technologies. Choices made at the lower layers matter.

The market has recently become very competitive. While VMware, as the market pioneer, has the lion's share of the market today, the market will grow, in terms of volume, five-fold during the next three years. Acquisitions and new investments have brought large software vendors like Microsoft and Oracle to this market. A large percentage of companies (mostly small and midsize) have not yet started to virtualize, and they have choices that didn't exist nine years ago. During the next several years, this market will be shaped by further acquisitions; significant investments into complementary management, automation and application development markets; and expansion of the cloud-computing trend. While customer value will continue to shift to add-on tools and technologies for this virtualization infrastructure market, the low-level virtualization platform will remain the foundation for those tools, thus will remain important.

This market was pioneered by VMware (for enterprises), and by SWsoft (now Parallels) and open-source Xen (for service providers). Key initial product introductions and acquisitions in the history of the x86 server virtualization infrastructure market include:

<p>2001 VMware ESX Server</p> <p>SWsoft (now Parallels) Virtuozzo</p>	<p>2004 Microsoft Virtual Server 2005</p> <p><i>EMC acquires VMware</i></p> <p><i>SWsoft acquires Parallels</i></p>
<p>2003 Xen (open source)</p> <p><i>Microsoft acquires Connectix VM technology</i></p>	<p>2005 Solaris 10 (includes Containers)</p> <p>Novell Suse Linux Enterprise 10 (with Xen)</p>

Figure 1. Magic Quadrant for x86 Server Virtualization Infrastructure



Source: Gartner (May 2010)

<p>2006 XenSource XenServer</p> <p>Virtual Iron</p>	<ul style="list-style-type: none"> • They must provide x86 server-based solutions to virtualize applications from operating systems, or operating systems from x86 server hardware, using:
<p>2007 KVM (open source – led by Qumranet)</p> <p>Oracle VM</p> <p>Red Hat Enterprise Linux 5.0 (includes Xen)</p> <p>KVM included in Linux kernel</p> <p><i>Citrix acquires XenSource</i></p> <p><i>VMware partial initial public offering (IPO)</i></p>	<ul style="list-style-type: none"> • Hypervisors • Container technology • They must provide basic administrative tools for those solutions: • Administrative management frameworks/suites for hypervisors/containers • Embedded virtualization management technology (e.g., live migration)
<p>2008 Microsoft Hyper-V</p> <p><i>Red Hat acquires Qumranet</i></p>	<ul style="list-style-type: none"> • They must have at least 100 different organizations using their generally available products as of 1 February 2010.
<p>2009 Red Hat Enterprise Virtualization (RHEV)</p> <p><i>Oracle acquires Sun and Virtual Iron</i></p>	

Market Definition/Description

The x86 server virtualization infrastructure market is defined by organizations that are looking for solutions to virtualize their applications from their x86 server hardware or operating systems, reducing hardware and associated waste, and increasing flexibility in delivering server capacity that applications need. Solutions for this market leverage:

- Hypervisors to create virtual machines
- Shared operating system virtualization technologies (also called “containers”)
- Server virtualization administrative management (base frameworks)
- Server virtualization embedded management (live migration, basic automation of administrative management functions)

Not included are higher-level management functions, such as operational automation tools that recognize and include virtualization, application performance tools that leverage and monitor virtualization, disaster recovery tools that leverage virtualization, etc.

Inclusion and Exclusion Criteria

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

- They must provide x86 server-based solutions to virtualize applications from operating systems, or operating systems from x86 server hardware, using:
- Hypervisors
- Container technology
- They must provide basic administrative tools for those solutions:
- Administrative management frameworks/suites for hypervisors/containers
- Embedded virtualization management technology (e.g., live migration)
- They must have at least 100 different organizations using their generally available products as of 1 February 2010.

Open-Source Communities (e.g., Xen and KVM hypervisors) Versus Vendor-Embedded Open-Source Software Business Models

The x86 server virtualization infrastructure Magic Quadrant includes only commercial vendor-based offerings, and not individual positions and evaluations for open-source software (OSS) projects, such as KVM and Xen. The omission of Xen and KVM as OSS projects was a deliberate decision. The open-source projects would be penalized in this Magic Quadrant as a consequence of being community-sponsored development, compared with the specific financial and marketing goals of vendors *using the same underlying technology*. We wrestled with the pros and cons of articulating such drawbacks when IT organizations evaluate the merits of community-supported versus vendor-supported virtualization projects. Inevitably, companies driving strategic virtualization projects within an enterprise or government agency need to be aware of such differences, but a Magic Quadrant is often a graphic tool of high influence in decision making in which the detailed analysis underlying the graphic is glossed over or not read at all. Therefore, we anticipated that when Magic Quadrant positions were established for Oracle, Novell and Citrix for Xen, and Red Hat for KVM, their higher scores in marketing understanding, marketing strategy and sales strategy, compared with the open-source versions of Xen and KVM, would create contradictions and confusion for those making hasty judgments about these hypervisors.

Open-source communities are primarily founded and driven by developing code bases to provide specific software services. The motivation usually centers on a gap in the OSS solutions stacks or a lack of competitive equivalence to proprietary solutions. In the case of Xen and KVM, both arose to fill a market gap for an open-source version of a hypervisor for Linux and other OSS environments. Open-source communities thrive on attracting

interest among developers who desire to be part of a team led by “brilliant” code developers and maintainers. Linux has been an excellent example, but Xen and KVM have become additional worthy examples as well. Often, however, the better developers seek monetary rewards (unless they are employed and supported by a vendor).

Financial compensation usually occurs when the open-source project becomes the cornerstone of a vendor’s strategy by an acquisition in which salaries and management positions are the rewards and continuing motivation for vendor-led enhancements of OSS projects (e.g., KVM by Red Hat; Xen by Citrix; MySQL by Sun and, later Oracle; and the acquisition of JBoss by Red Hat). The results of these acquisitions become influencing factors in Gartner’s Magic Quadrant analysis. For example, the leadership of the Xen open-source community was acquired by Citrix, while the core development team of KVM, originally formed by an Israeli company called Qumranet, was acquired by Red Hat.

Xen (www.xen.org) and KVM (www.linux-kvm.org) continue to exist as independent open-source projects. They welcome developers to enhance the code base and contribute to additional implementations (e.g., Xen Cloud, Xen Orchestra, Security, paravirtualization, etc.), although the original hypervisor project and many of its developers were acquired by a vendor, and the core hypervisor code has reached stability for the purpose intended. Meanwhile, the vendors expand from the core code to develop, expand and integrate features (e.g., virtual machine life cycle creation, optimization, capacity planning, mobility, diagnostics, monitoring, storage management, high availability, portal, etc.). The x86 server virtualization infrastructure Magic Quadrant is aimed at the higher level of differentiating the virtualization market on innovation, marketing, financial results, strategic understanding and vision by the vendors with virtualization solutions for x86 server platforms.

Does this preclude users from selecting and managing their own virtualization destinations by downloading the OSS code and building customized solutions? Not at all. 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. They may even contribute enhancements and bug fixes back to the community as part of a desire to maintain the viability of the community. The Linux community has demonstrated this approach, where community-supported Linux projects, such as CentOS (<http://centos.org>) and Scientific Linux (www.scientificlinux.org) continue to thrive. Meanwhile, the free-standing OSS projects enable server hardware platform and software vendors (e.g., management tools) to integrate the project’s base code with their platforms (e.g., Citrix XenServer, Oracle VM on Xen, Novell PlateSpin products such as Orchestrate, etc.).

If we had decided to evaluate Xen and KVM as OSS Magic Quadrant positions, they would have had lower evaluation scores for the marketing-oriented criteria, because their models are

technically driven versus the vendor-driven business drivers. Vendors are evaluated on their management ecosystems, financial resources, sales and marketing expertise, and integration services. OSS projects do not have business models or financial resources, other than voluntary contributions and support in the community and among vendors.

Users have the choice of selecting either vendor-specific implementations of virtualization or OSS-community-supported projects, including the types of virtualization (operating system hosted versus hypervisors) inclusive of monitoring and management tools, or a build-your-own approach, with self-maintenance or support of external service providers. The self-maintenance and integration approach avoids subscription support licenses and vendor dependencies, but will add to internal support costs if skills are minimal or infrastructures are poorly implemented and result in higher-than-average startup costs and production and maintenance downtimes.

Added

No vendors were added to this Magic Quadrant.

Dropped

No vendors were dropped from this Magic Quadrant.

Evaluation Criteria

Ability to Execute

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

Table 1. Ability to Execute Evaluation Criteria

Evaluation Criteria	Weighting
Product/Service	high
Overall Viability (Business Unit, Financial, Strategy, Organization)	high
Sales Execution/Pricing	high
Market Responsiveness and Track Record	low
Marketing Execution	high
Customer Experience	standard
Operation	low

Source: Gartner (May 2010)

Ability to execute in server virtualization is not simply about product features, but also very much about maintaining a constantly changing business model in a very dynamic trend. Good products could fail, and poor products could be very successful, based on effective vendor execution.

- Product/Service:** Core goods and services offered by the technology provider that compete in/serve the defined market. This includes current product/service capabilities, quality, feature sets, skills, etc., whether offered natively or through OEM agreements/partnerships. Key factors that are evaluated include: range of operating systems 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.
- Overall Viability (Business Unit, Financial, Strategy, Organization):** 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:** 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.
- Market Responsiveness and Track Record:** The 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:** 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, 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, etc.

Table 2. Completeness of Vision Evaluation Criteria

Evaluation Criteria	Weighting
Market Understanding	high
Marketing Strategy	high
Sales Strategy	standard
Offering (Product) Strategy	standard
Business Model	standard
Vertical/Industry Strategy	standard
Innovation	standard
Geographic Strategy	low
Source: Gartner (May 2010)	

- Operations:** 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 (see Table 1).

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. Ultimately, technology providers are rated on their understanding of how market forces can be exploited to create opportunity for the providers.

In the server virtualization market, vendor understanding and articulation of the strategic path for virtualization (expanding into the foundation for the future of infrastructure architecture and operations, and extending toward cloud computing) is particularly important and differentiating.

- Market Understanding:** The ability of the technology provider 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 can shape or enhance those wants 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:** 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.
- **Business Model:** The soundness and logic of a technology provider's underlying strategic business proposition.
- **Vertical/Industry Strategy:** The technology provider's strategy to direct resources, skills and offerings to meet the specific needs of individual market segments, including verticals.
- **Innovation:** Direct, related, complementary and synergistic layouts of resources, expertise or capital for investment, consolidation, defensive or pre-emptive purposes.
- **Geographic Strategy:** The technology provider'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 the geography and market (see Table 2).

Leaders

VMware stands alone as a leader in this Magic Quadrant. While challengers are emerging, VMware has a tremendous head start in this market. It is clearly ahead in understanding the market, and is ahead in product strategy, business model, technology innovation, product capabilities and sales execution. The vendor's challenge is to maintain its momentum in all those areas, which will be difficult in the face of several strong competitors that are investing heavily and will put pressure on VMware's business model.

Challengers

Microsoft is the only competitor in the Challengers quadrant. Microsoft is still learning about this market and its needs, and will need to continue to improve its product strategy and technology innovation to become a leader. In this rapidly growing market, improving its product offering and sales execution (especially in large accounts) will remain important.

Visionaries

Citrix sits alone in the Visionaries quadrant. It combines a deep understanding of the market, solid innovation and good product strategy with challenges in sales execution, marketing execution and questions about the long-term viability of its XenServer offering (versus, for example, a potential for increased focus on managing Hyper-V). The signs for Citrix are positive, however, as activations

of free XenServer increase. Gartner considers its product functionality second only to VMware. The question is whether Citrix can maintain and monetize that momentum in the face of VMware in large enterprises, Microsoft in smaller enterprises, and Red Hat from an open-source perspective.

Niche Players

There are several types of niche players in this market. Red Hat and Oracle VM are relatively new to this market. Parallels and Oracle Solaris Containers aren't new, but are challenged to expand their market shares and marketing against strong competitors. Novell has an offering, but is more strategically focused on heterogeneous virtualization management tools and its "Guest OS" position. There is room for niche players in this large and growing market, but they need to differentiate themselves enough and fill a specific market need to be successful.

Vendor Strengths and Cautions

Citrix

After its acquisition of XenSource, Citrix became a visionary virtualization vendor stuck between a dominant market leader (VMware, in enterprise accounts) and an up-and-coming Microsoft (everywhere else). Citrix has the vision, and has a solid product offering. The challenge for Citrix has been to find a sizeable market niche (either underserved or complementary to Microsoft). Marketing execution has also been an issue. Citrix has been more successful with its current customers. Its bold move to make XenServer (including XenCenter and XenMotion) free has resulted in a large upswing of product activations. However, the vendor has not yet been able to monetize that with product maintenance agreements or its add-on Essentials management offering. Citrix is also trying to find a comfortable complementary role with Microsoft's Hyper-V, adding extended management tools to Microsoft's offering (which might reduce its reliance on its own offering, XenServer). The challenge here is that Microsoft has yet to define a server virtualization market space that it will leave to Citrix. Given the competition with VMware, Microsoft feels it needs to expand broadly. Citrix executives have also made public statements that the Xen hypervisor is not necessarily strategic to it; instead, its future is about virtualization management, which could be on top of Xen or Hyper-V. If Citrix can successfully build a strong management suite and business model, this strategy certainly could make sense. However, its future, in many ways, is dependent on its partner Microsoft leaving room in the market for it.

Strengths

- Vision for using virtualization to enable cloud computing
- Product offering – capabilities and innovation
- Relationship with Microsoft (versus being an outright competitor)

- Leader in offering a product based on OSS, and potential to leverage strong installed base of Xen in service providers and OSS-centric verticals (like government)
- Ability to leverage XenApp installed base for XenServer sales

Cautions

- Business model – converting free product activations into revenue for maintenance and management tools
- Marketing execution and reach
- Long-term viability of a Xen-based virtualization strategy
- OSS-based competition (especially from Red Hat with KVM)
- Avoiding market conflict in its partnership with Microsoft

Microsoft

Microsoft's virtualization story is coming together. For four years, Microsoft's answer to VMware was Virtual Server 2005. Hyper-V is a much stronger competitive offering, and with live migration in Hyper-V R2 (introduced in late 2009), Microsoft competes very well in midsize organizations that are just now beginning to virtualize. Microsoft's biggest challenge is overcoming VMware's deep market penetration in all but smaller enterprises that have been slow to virtualize. In many ways, Microsoft has been left with the late technology adopters. Although Microsoft's strategy is beginning to include the concept of private cloud computing (similar to VMware's strategy), Microsoft's customer base is less likely to deploy private clouds (smaller companies that would see less value in private cloud computing, and slower technology adopters that might be less willing to make dramatic changes). Microsoft must find a way to attract existing VMware customers – not easy as long as VMware executes well. Microsoft will also be hugely threatened if VMware continues to expand its architectural influence in infrastructure. Microsoft's biggest trump card is that it does not need virtualization to be a stand-alone business, so it will be able to maintain a price advantage on VMware.

Strengths

- Administrative environment that is familiar to Windows administrators
- Midsize enterprise installed base of Windows
- Strength of solution (and price) for midsize enterprises

- Complementary strength in application architecture that can be leveraged to expand virtualization share
- Company financial strength

Cautions

- Limited innovation and reactive strategy in a rapidly evolving market
- Uphill battle breaking into a very strong VMware installed base, especially in large enterprises
- Microsoft's evolving strategy and road map with respect to virtualization's tie with cloud computing
- Single point of failure/planned downtime in parent operating system (can be mitigated using Server Core)

Novell

Novell's strategic focus in virtualization lies in heterogeneous management software and its "Perfect Guest OS" strategy – beyond the scope of this Magic Quadrant. Its position as a niche player represents Novell's strategic investment choice.

Novell originally based its strategic virtualization direction on the Xen hypervisor (since 2003) combined with Suse Enterprise Linux platforms (well before the advent of KVM in 2007). Xen was driven, and continues to be driven, by a strong OSS community and vendor support. With KVM's maturity and its acceptance by the Linux kernel community, KVM is gaining interest. The difficulty for Novell is not in supporting KVM (which it has announced), but in Red Hat's initiative of acquiring all the key developers and maintainers of KVM, and its claims of certifying RHEL applications on KVM as a byproduct of Linux. During the past 24 months, however, Novell has changed its virtualization strategy from a focus on virtualization infrastructure to what it characterizes as being the "perfect Linux guest" on all the major hypervisors. It has formed alliances with Microsoft and Citrix to support Suse as a Linux guest operating system on each of their hypervisors, and we believe it will pursue other similar agreements.

The primary differentiation in Novell's "Perfect Guest OS" strategy will be in delivering Suse Linux and management tools above the hypervisor layer as a multivendor heterogeneous market opportunity. Novell's acquisition of PlateSpin enables it to create value around Suse guest support and management, independent of the hypervisor. Novell's differentiation is magnified by its partnership with Microsoft for cross-operating system (Linux and Windows) guest hosting and virtual machine mobility and interoperability. Due to the lagging maturity of the Linux virtualization market

(compared with Windows/VMware), most Linux IT shops have not had much exposure to automation tools, nor have they installed and implemented large Linux virtualization projects. Citrix has been the key driving force. This leaves a wide-open market opportunity for Novell, Red Hat, Oracle and Citrix, in conjunction with the incumbent VMware, to boost market share among Linux deployments in IT shops. Novell has chosen not to compete directly, but will need strong execution, especially in co-marketing with its partners, to fulfill on its expanding vision, in which user decisions are made above the hypervisor layer, and it will want options to run Linux on heterogeneous virtualization platforms.

Strengths

- Xen open-source community success
- Microsoft interoperability partnership
- Choice of Xen and KVM options

Cautions

- Relatively slow market acceptance
- Stewardship of KVM and Xen by competitors
- Weak leverage of Suse Enterprise Linux strengths
- Lagging independent software vendor ecosystem enthusiasm
- Lagging mind share and poor marketing in the data center

Oracle Solaris Containers

Prior to the Oracle acquisition, Sun had built a respectable base running Solaris Containers predominantly on SPARC, but a much smaller installed base running on Solaris x86. Oracle Solaris Containers offers a lightweight solution that sacrifices portability and application coverage for price, ease of use and multiversion Solaris support. As part of the Oracle portfolio, Oracle Solaris Containers offers shared operating system virtualization capabilities for tactical x86 deployments. The role of Oracle Solaris Containers in Oracle's expanding virtualization portfolio is not as clear as the role and future of Oracle VM; however, now that the acquisition of Sun is complete, Gartner expects Oracle to evolve its virtualization strategy and marketing of its virtualization portfolio over time. Regardless, Oracle Solaris Containers provides differentiated benefits for x86 Solaris users – higher virtualization density, and reduced operational costs due to fewer operating system instances – something that hypervisor-based solutions cannot do. In this sense, Oracle Solaris Containers and Oracle VM can be complementary solutions, targeted at different application requirements.

Strengths

- Lightweight implementation
- Easy to manage
- Reduced administrative and operating system software costs, compared with hypervisor-based solutions
- Supports multiple Solaris versions

Cautions

- Limited adoption on x86 architecture servers
- Difficult to leverage large installed base of applications running on SPARC-based Solaris
- Solaris-only support
- Portability and robustness limitations
- Single point of failure/planned downtime in host operating system

Oracle VM

Oracle VM is Oracle's implementation of the Xen hypervisor that also leverages intellectual property acquired from Sun and Virtual Iron. While these acquired products had commonality, Oracle is still months away from fully integrating them into a coherent and integrated solution (but significant progress is expected through late 2010 and early 2011). Oracle is converging on the Oracle VM Manager to manage all of its virtualization portfolio. This includes Oracle VM (an x86 architecture product, based on Xen, which is covered here), Oracle VM Server for SPARC (based on Sun LDOMS technology), Oracle Solaris Containers, software appliances using Oracle VM, storage and other related virtualized infrastructure. This management unification is an important direction and foundation for Oracle virtualization products as it builds an integrated approach to selling virtualized database management system and application server hardware, software solutions, attached storage, and Oracle-based management solutions. Among competitive x86-hypervisor-based solutions, Oracle has chosen to certify its software solely on Oracle VM. Most of the customer references that Gartner investigated stated that certification was their primary reason for choosing Oracle VM. In addition, Oracle favors Oracle VM for software licensing and pricing, for example, with processor pinning (allowing the specification of a limited number of processors being used by a VM, which can reduce software costs). In general, Oracle VM is a solid, but still evolving, solution for Oracle-centric architectures, and Oracle VM will become a valuable component of an integrated Oracle-managed architecture as more management features are added.

Strengths

- Oracle VM is becoming a part of a broader and integrated managed virtualization portfolio for Oracle-centric architectures
- Preferential licensing and certification of Oracle software using Oracle VM
- Oracle's overall software installed base and financial strength

Cautions

- Limited (but evolving) understanding of the virtualization market and market requirements
- Fragmented product and management strategy until acquisitions are fully absorbed
- Limited functionality in current product offering

Parallels

Parallels Virtuozzo Containers is a shared operating system virtualization solution available for Linux or Windows operating systems. It allows multiple applications to run in lightweight, separate containers offering processor affinity and memory protection and isolation. Compared with hypervisor-based solutions, Parallels Virtuozzo Containers can reduce operating system software and administration costs. Parallels also offers some portability and workload migration capabilities. Parallels has been most successful with service providers, especially for managing high-density Linux deployments. It has had less success with its Windows-based offering in the enterprise IT market. While innovative, Parallels Virtuozzo Containers also extends core operating system kernel code, which increases the potential for patch conflicts or new security issues. However, to Parallels' credit, references have not reported encountering these issues.

Parallels' recent Baremetal Server product, which is a hybrid hypervisor and container-based solution, is not covered in this Magic Quadrant, as it is new and additional references need to be attained.

Strengths

- Unique and innovative multioperating system, container-based solution, including live migration and increased isolation
- Reduced administrative and operating system software costs compared with hypervisor-based solutions
- Installed base of service providers with high-density, homogeneous workload needs (especially Web servers)

Cautions

- Small market share of enterprise customers
- Extends operating system kernel code, causing the potential for software errors or conflicts
- Single point of failure/planned downtime in host operating system

Red Hat

Red Hat has enjoyed enormous success in the Linux distribution business. With the large Linux installed base, many enterprises are prime market opportunities for Red Hat to assert leadership in virtualization. However, despite the launch of the open-source Xen hypervisor in 2003, it has taken Red Hat seven years to offer an unambiguous and coherent virtualization solution, now called RHEV (Red Hat Enterprise Virtualization). Red Hat has had plenty of opportunity to understand and develop its own virtualization strategy, but it's getting late to assert itself as a market-driving force, with roughly 25% penetration rates and high growth in VMware. As late as 2009, Red Hat had still not settled on its strategic hypervisor choice, eventually acquiring Qumranet and its KVM developers. Prior to that, it had also not settled on an administrative tools strategy, at one time suggesting a portfolio of OSS projects and a management interface (libvirt). During this period, Citrix acquired the key Xen hypervisor developers and delivered XenServer, effectively pressuring Red Hat. In addition, all major server vendors aligned themselves behind Xen to prepare for an expected ramp up in the Linux market. The expected market surge has not materialized, and, today, Red Hat finds itself in a defensive posture vis-a-vis the success of VMware and the emergence of Microsoft and Citrix. Because RHEV tools are in their first versions, Red Hat is faced with waging a marketing campaign on the basis of total cost of ownership, compared to VMware. Moreover, its management console is based on Windows, not Linux. Red Hat will likely develop a console based on Linux, but this may further delay users making a strategic Red Hat decision.

Gartner's client contacts reveal some cautious interest in Red Hat virtualization, a departure from the enthusiasm vested in RHEL. KVM has been gaining more attention from OEMs such as IBM (and even Novell), and some large enterprises have been piloting KVM. Because Red Hat's RHEL is widely deployed and KVM is a kernel-loadable module, it should not be too difficult for Red Hat to extend its operating system subscriptions with hypervisor integration and support. By 2012, Red Hat must show rapid uptake in upselling its accounts to activate KVM with RHEV management features on or close to parity with Citrix, Microsoft and Oracle. At this stage, users are in pilots and are ambivalent about its capabilities, and Red Hat's long-term plans to become a strategic virtualization player.

Strengths

- Strong and loyal RHEL customer base opportunity (largely unvirtualized)
- Integrated hypervisor with Linux kernel (e.g., leveraging mature scheduling)
- Ease of access and installability
- Acquisition of the core KVM OSS development community

Cautions

- Updates/certifications dependent on Linux kernel upgrades
- Limited ecosystem of tool vendors and applications
- Lagging marketing vision, response and user experience
- Limited production use of dynamic mobility

VMware

VMware is the clear market leader. While it pioneered the x86 server virtualization market (based on a strong business case for consolidation cost savings), there was very little competitive pressure for the first few years. Now that open-source-based alternatives are maturing, Microsoft has put its full weight behind virtualization and Oracle has entered the virtual machine market, VMware's strategy for success must continue to evolve. As the penetration of virtualization expands, and with fewer servers over time to consolidate, the rationale for investing in VMware will need to shift to improved operational and business benefits. VMware's challenge is to protect and grow its installed base and technology leadership as it expands into complementary markets that leverage virtualization, such as cloud computing. The vendor's business model will continually need to change as market conditions change (for example, VMware's offerings targeting the midsize market had a relatively high price point until recently, when Microsoft entered

the market, combined with less effective market reach into the midsize opportunity). As competitive offerings mature, VMware will be challenged to maintain a value differentiation that continues to justify its relatively high price.

Strengths

- Far-reaching virtualization strategy that includes enabling cloud computing, new application architectures and broader management
- Technology leadership and innovation
- High customer satisfaction
- Large installed base (especially in the Global 2000), and rapid growth of service providers planning to use VMware (vCloud initiative)

Cautions

- Maintaining growth as it rapidly evolves the business model
- Weaker execution today for new customers in the midsize enterprise market
- Dependence on expansion into new and challenging complementary markets (for example, IT and service automation, application architecture)
- Potential strategy and acquisition impacts caused by EMC's majority ownership and potentially conflicting goals

We review and adjust our inclusion criteria for Magic Quadrants and MarketScopes as markets change. As a result of these adjustments, the mix of vendors in any Magic Quadrant or MarketScope may change over time. A vendor appearing in a Magic Quadrant or MarketScope one year and not the next does not necessarily indicate that we have changed our opinion of that vendor. This may be a reflection of a change in the market and, therefore, changed evaluation criteria, or a change of focus by a vendor.

Evaluation Criteria Definitions

Ability to Execute

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

Overall Viability (Business Unit, Financial, Strategy, Organization): 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 and Track 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 Web site, 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.