



Magic Quadrant for Public Cloud Infrastructure as a Service

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VIEW SUMMARY

Public cloud compute infrastructure as a service (on-demand virtual data center services on shared infrastructure) is a still-maturing, rapidly evolving market. Each vendor has a unique offering, and the sourcing of these services must be done with care.

What You Need to Know

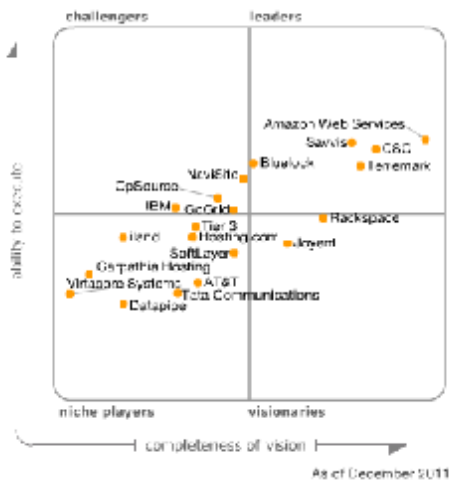
When people think about "cloud computing," public cloud infrastructure as a service (IaaS) is often one of the first things that comes to mind. It's the "computing" in cloud computing — on-demand compute, storage and network resources in a shared multitenant environment. There has been tremendous hype surrounding these services, but there are a number of use cases for which cloud IaaS delivers excellent business value. Although the market is immature, it is evolving rapidly; it is already past the Peak of Inflated Expectations on Gartner's "Hype Cycle for Cloud Computing, 2011," and is expected to move quickly toward the Plateau of Productivity. Unfortunately, there is a great deal of market confusion and many vendors articulate their offerings poorly. Therefore, care should be taken in sourcing these services.

The common use cases for public cloud compute IaaS are: development and testing environments; high-performance computing and batch processing; Internet-facing websites and Web-based applications (which may or may not have architectures specifically designed for the cloud); and non-mission-critical internal business applications. These use cases are typically peripheral to the organization's infrastructure needs. However, many businesses, especially in the midmarket, are considering eventually migrating away from running their own data centers in favor of relying primarily on infrastructure in the cloud. Consequently, although sourcing cloud IaaS is typically a tactical decision, many organizations are also looking for long-term strategic partners. However, we believe that the market is too immature for strategic choices to be made at this stage, and we recommend that prospective customers focus on finding the cloud provider that matches their specific use case. In many cases, businesses may have to use multiple cloud IaaS providers to meet the needs of a set of diverse use cases.

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Magic Quadrant

Figure 1. Magic Quadrant for Public Cloud Infrastructure as a Service



Source: Gartner (December 2011)

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Market Overview

Public cloud compute IaaS (hereafter referred to simply as "public cloud IaaS" or "IaaS") provides virtual machines (VMs), and associated storage and network resources, from a shared, multitenant pool of capacity. IaaS is delivered in a highly standardized manner, so it can be highly automated, and the customer can self-service. In IaaS, the provider manages the data center facilities, hardware and virtualization, but everything above the hypervisor layer — the OS, middleware and application — is managed by the customer, or is an add-on managed service from the provider or another third party. This market is wholly separate and distinct from cloud platform as a service (PaaS) and software as a

EVIDENCE

- Gartner client inquiries in 2010 and 2011.
- Vendor interviews, surveys and product demonstrations in 2010 and 2011.
- Vendor-provided customer references in 2010 and 2011.
- Hands-on trials of service offerings.
- Public information, such as U.S. Securities and Exchange Commission filings, press releases, vendor websites and community support forums.

VENDORS ADDED OR DROPPED

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. These include 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. These include 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, and SLAs.

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.

service (SaaS).

Public cloud IaaS is not a commoditized service, and even providers with very similar offerings and underlying technologies often have sufficiently different implementations that there is a material difference in availability, performance, security and service features. See "Evaluating Cloud Infrastructure as a Service" and its related reports to understand the range of options available in this market.

What Type of Workloads Are Being Placed on Public Cloud IaaS?

There are three broad categories of customer needs in public cloud IaaS:

The hosting of a single application, or a closely related group of applications.

A "virtual data center" (VDC) that will serve a broad range of different workloads.

Batch computing.

Hosting is the most common need. For instance, a media company with a marketing microsite for a movie, a software company offering SaaS and a retailer needing a lightweight version of its e-commerce site for disaster-recovery purposes are all examples of customers with hosting needs that can be fulfilled by IaaS. These are generally production applications, although there is some test and development as well. Some of these customers have mission-critical needs, while others do not.

Customers with a broad range of unrelated workloads are less commonplace, but are growing in importance, particularly in the midmarket, where IaaS is gradually replacing or supplementing traditional data center infrastructure. The VDC is typically used very similarly to the organization's internal virtualization environment — primarily for less mission-critical production applications, or test and development environments — but is increasingly being used to run more mission-critical applications.

The least common need, but one that nevertheless drives significant revenue for the small number of providers that service this portion of the market, is batch computing. For these customers, IaaS serves as a substitute for traditional high-performance computing or grid computing. Customer needs include rendering, video encoding, genetic sequencing, modeling and simulation, numerical analysis and data analytics. Other than the need to access large amounts of commodity compute at the lowest possible price, with little concern for infrastructure reliability, these customers typically have needs very similar to those of VDC customers.

What Are the Key Market Aspects of Which Buyers Should Be Aware?

One size does not fit all. As the market matures, clarity is emerging about the range of different customer needs. Workloads vary in their availability and performance needs, and in the general complexity of the overall application infrastructure. Customers vary in the importance that they place on security, customer service and ease of use. Customers also vary in how much they want to manage themselves, versus how much they want the IaaS provider to manage for them. While some providers are beginning to address differentiated customer needs in a targeted fashion, most service providers still take a "one size fits all" approach, which can make it difficult to determine if a particular provider is the right one for a particular set of business and technical needs.

IaaS providers are increasingly "enterprise class." Although there are many new entrants in the market that are targeting primarily small businesses, most providers target the midmarket and the enterprise, or technology companies (particularly those with online businesses, such as SaaS companies). Although the majority of public cloud IaaS revenue is in so-called "commodity" IaaS — low-cost offerings with best-effort availability and performance — the greatest revenue opportunities in the long term are in enterprise-grade IaaS, with high availability, consistently good performance, strong security, excellent customer service and optional managed services. Commodity IaaS is often useful for running new, "cloud native" applications that have been architected with cloud transaction processing principles in mind (see "From OLTP to Cloud TP: The Third Era of Transaction Processing Aims to the Cloud"), but enterprise-grade IaaS allows businesses to migrate applications from their own virtualized servers in internal data centers into the cloud, without changes.

The buying centers for IaaS are diverse. The early adopters in the IaaS market were developers. As the market matures, developers remain an important audience, because a great deal of IaaS adoption is business led — driven by business managers who hold the budget, need greater agility and have shorter time frames than IT Operations is able to accommodate, and who therefore turn to application developers and enterprise architects for a solution. This is particularly true for the single-application, "hosting" side of the market. IT Operations is, however, increasingly involved in IaaS sourcing, and is likely to be the primary buying center for multiple-application needs. IaaS providers vary in their ability to target these different buying centers. Furthermore, most providers focus on either a developer audience or an IT operations audience, and their feature set and style of service are oriented accordingly.

More aspects of IT operations management are being automated, so that IaaS offers value beyond self-service provisioning. For companies with reasonable access to capital and which already have an IT operations team, today's IaaS offerings may not represent cost savings for typical business workloads. Self-service provisioning in the public cloud is often not a significant improvement over a well-managed virtualized infrastructure within an internal data center. To truly drive value to customers, cloud IaaS providers must expose superior IT operations management tools to customers, and find ways to reduce the burden of operations, starting with automated patch management and backups. Manual managed services are frequently used to substitute for automated offerings. Evolving toward the delivery of automated IT operations management, in conjunction with self-service tools and reports, is critical for leadership in this market. Similarly, providers are increasingly offering programmatic (API) access to their infrastructure, which enables customers, as well as third parties, to build management tools for their platforms.

Customers do not usually save money by using cloud IaaS. While many customers first investigate using IaaS to achieve cost savings, most customers buy IaaS to achieve greater business agility, or to gain access to infrastructure capabilities that they do not have within their own data center. IaaS can drive significant cost savings when customers have short-term, seasonal, disaster recovery or batch computing needs. It can also be a boon to companies with limited access to capital and to small companies, especially startups, which cannot afford to invest in infrastructure. (See "Cloud Computing Can Be the Singular Solution for at Least Five Use Cases" for details.) For larger businesses with existing internal data centers and IT operations teams, public cloud IaaS for steady-state workloads is often no

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 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.

less expensive, and may be more expensive, than an internal private cloud. While provider efficiencies will increase over time, and automated managed services will substantially drive down the cost of infrastructure management, the state of technology has not yet advanced to that point.

The IaaS market is complex and evolving quickly, but is still very immature. These services vary widely, so significant due diligence must be taken to evaluate providers thoroughly. The service providers themselves are evolving extremely rapidly, with many releasing new features on a monthly basis. New entrants continue to launch offerings and existing providers are expanding the market segments that they serve. Many providers have ambitious visions but will be challenged to execute well, particularly given the aggressive pace of market evolution.

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MARKET DEFINITION/DESCRIPTION

Cloud infrastructure as a service (IaaS) parallels the infrastructure and data center initiatives of IT. Cloud compute IaaS constitutes the largest segment of this market (the broader market also includes cloud storage, backup and archiving). Only public cloud compute IaaS is evaluated in this Magic Quadrant; it does not cover private cloud IaaS (whether on-premises or off-premises), cloud storage providers, PaaS providers, SaaS providers, cloud services brokerages or any other type of cloud service provider.

Public cloud compute IaaS, in the context of this Magic Quadrant, is defined as a standardized, highly automated, massively multitenant offering, where compute resources, complemented by storage and networking capabilities, are owned and hosted by a service provider and offered to the customer on demand. The customer is able to self-provision this infrastructure, using a Web-based graphical user interface (UI) that serves as an IT operations management console for the overall environment; API access to the infrastructure may optionally be offered as well.

This Magic Quadrant primarily evaluates public cloud IaaS providers in the context of the fastest-growing use case among Gartner clients: the desire to have a "data center in the cloud," where the customer retains most of the IT operations responsibility. Gartner's clients are mainly enterprises, midmarket businesses and technology companies of all sizes, and the evaluation focuses on typical client requirements.

What Public Cloud IaaS Use Cases Are Covered by This Evaluation?

Gartner's market structure for cloud compute IaaS (defined in "Market Insight: Structuring the Cloud Compute IaaS Market") divides the market by two axes: single application needs versus needs that encompass multiple unrelated workloads; and the level of managed services. Unmanaged solutions do not have formal IT operations management; self-managed solutions require the customer to be responsible for all management at the guest OS layer and above; core foundation managed solutions make the provider responsible for the guest OS and most security functions; application stack managed solutions make the provider responsible for everything through the middleware layer. The eight segments of the full market are:

- Single application, unmanaged: developer-centric cloud hosting.
- Single application, self-managed: scale-out cloud hosting.
- Single application, core foundation managed: simple managed cloud hosting.
- Single application, application stack managed: complex managed cloud hosting.
- Multiple unrelated workloads, unmanaged: virtual lab environment.
- Multiple unrelated workloads, self-managed: self-managed VDC.
- Multiple unrelated workloads, core foundation managed: turnkey VDC.
- Multiple unrelated workloads, application stack managed: cloud-enabled data center outsourcing.

This Magic Quadrant represents only a portion of the market. The four segments of this market, and their use cases, represented by this Magic Quadrant are:

Scale-out cloud hosting. These customers typically have a website or Web application that they seek to run on dynamically scalable infrastructure. E-marketing sites (especially marketing microsites), SaaS enablement (that is, a software company sourcing infrastructure on which it will host its SaaS offering) and Microsoft SharePoint hosting are common use cases. Technology startups may be wholly dependent on scale-out cloud hosting to run their customer-facing infrastructure. These applications often have cloud-native architectures.

Virtual lab environment. These customers typically try to provide self-service infrastructure to a group of technical users, such as developers, scientists or engineers, for the purposes of test and development, or scientific computing or other batch computing. (See "Virtual Lab Automation: The Foundation for Private Cloud Infrastructure Service Delivery" for a guide to evaluating test and development environments; it covers both public and private cloud IaaS. See "How Cloud Computing Relates to Grid Computing" for details of batch computing on public cloud IaaS.)

Self-managed VDC. These customers seek self-provisioned, self-managed, cost-effective infrastructure as an alternative to buying their own equipment, virtualizing it and placing it into colocation or into their own data center. These customers typically run a variety of non-mission-critical business applications within the VDC, but may eventually intend to move as many workloads as possible into the VDC.

Turnkey VDC. These customers seek all the capabilities of a self-managed VDC, but want someone else to be responsible for securing that infrastructure and handling routine, non-value-added operations. Usually, they want management through the OS level, including OS patch management, and often want managed security services as well. Many of these management functions can be partially, if not fully, automated; at present, they generally require some human intervention by the service provider, but we expect them to become fully automated in the future. These customers do not want to give up control, and they view these functions as things that simply ought to be part of the service — they accept people performing these functions as a temporary substitute for automation. These customers typically run a variety of business applications, some or all of which may be mission-critical; they may eventually intend for cloud IaaS, in conjunction with colocation, to replace their existing data center infrastructure entirely.

This Magic Quadrant strongly emphasizes self-service and automation in a standardized environment. It is focused on the needs of customers whose primary need is self-service cloud IaaS, although it may be supplemented by a small amount of colocation or dedicated servers. Organizations that need significant

customization or managed services, or which are seeking cloud IaaS as a supplement to a traditional hosting solution ("hybrid hosting"), should see the forthcoming "Magic Quadrant for Managed Hosting and Cloud Infrastructure as a Service" instead.

Understanding the Vendor Profiles, Strengths and Cautions

IaaS providers that target enterprise and midmarket customers generally offer a high-quality service, with excellent availability, good performance, high security and good customer support. Exceptions to this will be noted in this Magic Quadrant's evaluations of individual providers. Keep the following in mind when reading the vendor profiles:

Most of the evaluated service providers are oriented toward the needs of traditional IT operations, with an emphasis on control, governance and security, and the ability to run both new applications and legacy workloads. The providers that are oriented toward the needs of developers are noted as such; these providers typically emphasize easy access to infrastructure for individuals who are building new applications.

Most of the service providers evaluated have a "reliable cloud," achieved through redundant infrastructure in conjunction with VM clustering; they are thus able to offer a very high SLA for infrastructure availability — often as high as 99.999% (sometimes expressed as a 100% SLA with a 10-minute exclusion). Offerings without VM clustering or an equivalent technology that provides higher levels of infrastructure availability than can be expected from a single physical server are referred to as "best effort cloud." In general, monthly availability SLAs of 99.95% and higher are the norm, and are typically higher than availability SLAs for managed hosting. Service credits for outages in a given month typically cap at 100% of the monthly bill. This availability percentage is typically non-negotiable, as it is based on an engineering estimate of the underlying infrastructure reliability.

Very few of the service providers in this Magic Quadrant have an SLA for compute or storage performance. However, most of the providers do not oversubscribe compute or RAM resources; providers that do not guarantee resource allocations are noted explicitly. Storage performance varies considerably between providers.

Many providers have additional SLAs, covering network availability and performance, customer service responsiveness and other service aspects.

Infrastructure resources are not normally automatically replicated into multiple data centers unless otherwise noted; customers are responsible for their own business continuity. Some providers offer optional disaster recovery solutions.

Most of the service providers offer either a shared resource pool (SRP) pricing model or are flexible on how they price the service. In the SRP model, customers contract for a certain amount of capacity (in terms of CPU and RAM), but can allocate that capacity to VMs in an arbitrary way, including being able to oversubscribe that capacity voluntarily; additional capacity can usually be purchased on demand by the hour. Providers that are paid by the VM, rather than on an SRP model, are noted as such. All the providers offer per-hour metering.

All the service providers offer an option for colocation, unless otherwise noted. Many customers have needs that require a small amount of supplemental colocation in conjunction with their cloud — most frequently for a large-scale database, but sometimes for specialized network equipment, software that cannot be licensed on virtualized servers, or legacy equipment. Colocation is specifically mentioned only when a service provider actively sells colocation as a stand-alone service; a significant number of midmarket customers plan to move into colocation and then gradually migrate into that provider's IaaS offering.

Many of the service providers also offer managed hosting on dedicated servers, and most offer optional managed services on IaaS. However, not all offer the same type of managed services on IaaS as they do on dedicated equipment.

Most of the providers have a private cloud IaaS offering as well. This may be a custom private cloud, or a "cookie cutter" private cloud where every customer is on standardized infrastructure and cloud management tools. It might or might not resemble the provider's public cloud service in either architecture or quality. A single architecture, feature set and cross-cloud management, for both public and private cloud IaaS, make it easier for customers to combine and migrate across service models as their needs dictate, and allow the provider to leverage its engineering investments more effectively.

All the service providers offer an option for private network connectivity (usually in the form of Multiprotocol Label Switching [MPLS] or Ethernet purchased from the customer's choice of carrier), unless otherwise noted.

Most of the providers support the use of Internet-based IPsec VPN, including allowing customers to use their own Internet Protocol address ranges. Some providers use Internet-based Secure Sockets Layer (SSL) VPN to enforce secure access to management consoles.

All the service providers evaluated claim to have high security standards. The extent of the security controls provided to customers varies significantly, though. Most providers offer a firewall (intrusion detection system/intrusion prevention system) as part of their offering, although a few offer only access control lists (ACLs) and a few offer no self-service network security at all. Most providers offer additional security services. Most of the service providers evaluated can offer solutions that will meet regulatory compliance needs.

Very few of the service providers offer availability and performance monitoring, visible in their customer portal, as part of their self-service IaaS offering. Some providers may offer monitoring as an option, and many will include it with a hybrid hosting or other managed services offering.

All the service providers evaluated offer a portal and self-service mechanism that is designed for multiple users and that offers hierarchical administration and role-based access control (RBAC), unless otherwise noted. We strongly recommend that customers that need these features, but want to use a provider that doesn't offer them, evaluate a third-party management tool, such as RightScale or enStratus.

We consider enterprise-class support to require 24/7 customer service, via phone and email, along with an account manager. Most providers include this with their offering. A few providers offer "community support" (where customers post to a public forum and hope that the provider will answer, or another user will help them), and charge extra for traditional customer support.

All the service providers evaluated will sign contracts with customers and can invoice; while some may also offer online sign-up and credit card billing, they recognize that enterprise buyers prefer contracts and invoices. Some will sign "zero dollar" contracts that do not commit a customer to a certain volume.

All the service providers evaluated are believed to be financially stable, with business plans that are adequately funded. Customers should not need to worry about them going out of business.

However, many of the smaller providers are likely to be potential acquisition targets; an acquisition can cause significant changes in the strategy and direction of a business, and may result in a service transition period if the merged companies consolidate their platforms.

Many of the service providers have white-label or reseller programs, and some may be willing to license their software. We mention software licensing only when it is a significant portion of the provider's business; other service providers, not enterprises, are usually the licensees. We do not mention channel programs; potential partners should simply assume that all these companies are open to discussing a relationship. See "Infrastructure as a Service in the Cloud Services Value Chain" for details.

When describing the providers, we briefly summarize the nature of the company, where the data centers that host their public cloud compute IaaS offering are located, and their range of service offerings. We specifically note other cloud-related services, such as cloud storage, as well as the availability of colocation, managed hosting and private cloud IaaS, even though those service offerings are not specifically evaluated in the context of this Magic Quadrant, because they are capabilities frequently requested by customers in conjunction with public cloud IaaS. (See "Market Insight: Customers Need Hybrid Cloud Compute Infrastructure as a Service" for details.)

We also state the basis of every provider's virtualization technology. For many customers, the underlying hypervisor will matter, particularly for customers that intend to run commercial software on IaaS. Many software vendors support only VMware virtualization, and those vendors that support Xen may support only Citrix Xen, not open-source Xen (which is often customized by IaaS providers and is likely to be different from the current open-source version).

Services that use VMware's virtualization technologies are labeled as follows:

vCloud Datacenter Service. This service has been certified to meet VMware's globally consistent service definitions, security and regulatory compliance requirements, and requirements for availability and high performance. It is based on a prescriptive architecture intended to maximize portability between providers of vCloud Datacenter Service and a business's own VMware-virtualized data center infrastructure. Only eight providers worldwide have such a service and several of them do not yet have a significant customer base on this platform. These providers also meet the requirements for being vCloud Powered.

vCloud Powered. These service providers are part of VMware's service provider partner program. The service is based on VMware's vSphere and vCloud Director (vCD), exposes the vCloud API, and supports the Open Virtualization Format (OVF) for image upload and download. Unless otherwise stated, these providers expose the vCD UI to customers. Because the vCD features exposed can be customized by the service provider, and the service provider typically needs to provide an array of features not included in vCD (such as monitoring), there is still significant differentiation between vCloud Powered providers. In a vCloud Powered offering with the vCD UI exposed, vCD is used to drive self-service management and provide a service catalog. vCD is a key part of VMware's strategy for driving adoption of hybrid internal-external cloud IaaS, and facilitates interoperability between VMware-virtualized infrastructures, regardless of whether they are internal to a business or offered by a service provider. vCD provides the capability to manage very complex infrastructure needs, but also requires a greater investment in training and setup time from an IT administrator in order to facilitate easier self-service for users.

vCloud Express. vCloud Express is a VMware-defined offering targeted at developers and small businesses, with online sign-up, credit card payment, self-service and by-the-hour service.

VMware-virtualized. This service uses VMware's hypervisor, but is not a vCloud Datacenter, vCloud Powered or vCloud Express service. Many such offerings are high-quality services from early, market-leading innovators; these service providers typically entered the market before vCD became available and have elected to continue to develop their own technology.

For each vendor, we also provide a recommendation for use. The most typical recommended uses are:

Cloud-native applications. These are applications that are specifically architected to run in a cloud IaaS environment, using cloud transaction processing (TP) principles.

E-business hosting. These are e-marketing sites, e-commerce sites, SaaS applications, and similar modern websites and Web-based applications. They are usually Internet facing. They are designed to scale out and are resilient to infrastructure failure, but they might not use cloud TP principles.

General business applications. These are the kinds of general-purpose workloads typically found in the internal data centers of most traditional businesses; the application users are usually located within the business. Many such workloads are small, and they are often not designed to scale out. They are usually architected with the assumption that the underlying infrastructure is reliable.

Test and development. These workloads are related to the development and testing of applications. They are assumed not to require high availability or high performance.

In the case of all vendors, the recommended use is specific to the four market segments evaluated within this Magic Quadrant — scale-out cloud hosting, virtual lab environment, self-managed VDC and turnkey VDC. This means that even if a provider excels in one aspect of a nonevaluated segment, such as complex managed cloud hosting, this will not be mentioned as a recommended use. The exception is hybrid hosting, as customers may blend solutions (for instance, an entirely self-managed front-end Web tier on public cloud IaaS, but managed hosting for the application servers and database), although hybrid hosting is often primarily a complex managed cloud hosting use case.

Inclusion and Exclusion Criteria

To appear in this Magic Quadrant, vendors had to meet, as of June 2011, the following criteria for their public cloud compute IaaS offering (excluding any private cloud computing, hosting or other services):

They must sell it as a stand-alone service, without the requirement to bundle it with managed hosting, application development, application maintenance or other outsourcing.

It must be enterprise class, offering 24/7 customer support (including phone support), SLAs and the ability to scale an application beyond the capacity of a single physical server.

It must be offered in a minimum of two data centers, located in different cities.

They must have significant market presence in public cloud IaaS services (by the definition used in this Magic Quadrant), as demonstrated by more than 1,000 VMs in production use in their public cloud, or more than \$10 million in 2010 cloud compute IaaS revenue.

Vendors Considered, but Not Included

This Magic Quadrant is global, but nearly all the providers are based in the U.S. This is a reflection of the way the market is evolving. The market has matured more quickly in the U.S. and the bulk of revenue comes from U.S.-based customers and flows to U.S.-based companies — U.S.-based IaaS providers typically derive 20% or more of their revenue from customers outside the U.S. (For details of how the U.S. market compares with the rest of the world, see "Market Trends: United States, Cloud Compute Infrastructure as a Service, 2011.")

A variety of service providers outside the U.S. offer enterprise-class public cloud IaaS but we were not able to include them because they did not meet the overall inclusion criteria. They include BT, Colt, Fujitsu, Orange Business Services, SingTel and SoftBank. The European market is profiled in "What's the Best Hosting or IaaS Solution for You in Europe?" and the Asia/Pacific market is profiled in "Competitive Landscape: CSPs' Hosting Services and Transition to the Cloud, Asia/Pacific, 2011."

In the evaluations for this Magic Quadrant, we considered a variety of interesting cloud IaaS providers but we were unable to include them because they did not meet the inclusion criteria for market presence. The more distinctive providers included:

CloudSigma, which has a unique pricing model with five-minute billing increments and programmatically accessible, demand-based, dynamic pricing.

FireHost, which specializes in compliant solutions, especially for PCI.

Harris, which has a "positive assurance" cloud offering that incorporates signature validation of components, targeted at high-security industries, such as defense.

nScaled, which specializes in solutions for companies with large amounts of confidential data, such as law firms.

Virtustream, which specializes in mission-critical workloads such as SAP, as well as solutions for media companies with batch computing needs for high-value content.

There were also service providers that did not have public cloud IaaS offerings in production by June 2011. These included Dell, HP and SunGard.

We excluded PaaS providers from this Magic Quadrant, even though some businesses may use PaaS in a very IaaS-like manner. For instance, the "VM role" functionality of Microsoft Windows Azure is sometimes used in an IaaS-like manner, as is Engine Yard's virtualization PaaS. However, these offerings do not allow customers to obtain raw VMs that can be loaded with arbitrary OSs, middleware and applications, which is a requirement for being considered as IaaS. For PaaS providers, see "Platform as a Service: Definition, Taxonomy and Vendor Landscape, 2011."

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ADDED

This Magic Quadrant is in its first iteration. Therefore, all vendors appearing in the Magic Quadrant are being included in this report for the first time.

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DROPPED

As this is the first iteration of this Magic Quadrant, no vendors were removed from this report.

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Evaluation Criteria

ABILITY TO EXECUTE

Gartner analysts evaluate technology providers on the quality and efficacy of the processes, systems, methods or procedures that enable IT providers' performance to be competitive, efficient and effective, and to positively affect revenue, retention and reputation. Ultimately, technology providers are judged on their ability to capitalize on their vision, and on their success in doing so.

We evaluated vendors' Ability to Execute in this market by using the following criteria:

Product/Service: Service providers were evaluated on the capabilities of their public cloud IaaS offering to support the four use cases being evaluated. We evaluated the breadth and depth of the feature set, self-service capabilities, automated system management and suitability to run a broad range of workload types.

Overall Viability (Business Unit, Financial, Strategy, Organization): Providers were evaluated on: the success of their public cloud IaaS business, as demonstrated by current revenue and revenue growth since the launch of their service; their financial wherewithal to continue investing in the business, and to execute successfully on their road maps; and their organizational commitment to this business, and its importance to the company's overall strategy.

Sales Execution/Pricing: Providers were evaluated on their ability to: address the range of buyers for public cloud IaaS, including developers and business managers, as well as IT operations organizations; adapt to "frictionless selling" with online sales, immediate trials and proofs of concept; provide consultative sales and solutions engineering; be highly responsive to prospective customers; and offer value for money.

Market Responsiveness and Track Record: The market is evolving extremely quickly and the rate of technological innovation is very high. Providers were evaluated on how well they have historically been able to respond to changing buyer needs and technology developments, rapidly iterate their service offerings, and deliver promised enhancements and services by the expected time.

Marketing Execution: Providers were evaluated on: their mind share and brand awareness in the market; their ability to convey marketing messages based on their ability to deliver real business value, not empty hype or misleading "cloudwashing;" and the clarity and accuracy of their marketing messages, compared with their actual service offering.

Customer Experience: Providers were evaluated on: the quality and responsiveness of their account management and technical support; the ease of use of their self-service functionality; the capabilities of their customer portal (additional functionality such as monitoring, reporting and trouble ticketing); the usefulness of their documentation and customer communications; the quality

of their SLAs; ease of doing business with them; and overall customer satisfaction.

Operations: Providers were evaluated on: their ability to meet their goals and commitments, including their track record of service delivery; the quality of their response to outages; and their ability to meet timelines that are communicated to customers and to the market.

Table 1. Ability to Execute Evaluation Criteria

Evaluation Criteria	Weighting
Product/Service	High
Overall Viability (Business Unit, Financial, Strategy, Organization)	Standard
Sales Execution/Pricing	Standard
Market Responsiveness and Track Record	High
Marketing Execution	Low
Customer Experience	High
Operations	Standard

Source: Gartner (December 2011)

COMPLETENESS OF VISION

Gartner analysts evaluate technology providers on their ability to articulate logical statements convincingly about current and future market direction, innovation, customer needs and competitive forces, as well as how they map to Gartner’s position. Ultimately, technology providers are assessed on their understanding of the ways in which market forces can be exploited to create opportunities.

We assessed vendors’ Completeness of Vision in this market by using the following criteria:

Market Understanding: Providers were evaluated on their understanding of the wants and needs of three different buying constituencies in this market — enterprises, midmarket businesses and technology companies of all sizes — both currently and in the longer term as the use of public cloud IaaS matures.

Marketing Strategy: Providers were evaluated on their ability to articulate their position in the market and their competitive differentiation, and to communicate these messages clearly and consistently, both internally and externally.

Sales Strategy: Providers were evaluated on their understanding of the buying centers for the market, and the way that these different buying centers want to engage with sales, as well as their strategy for adapting their sales force, online channel and partner channels to the public cloud IaaS market.

Offering (Product) Strategy: Providers were evaluated on the breadth, depth, quality and differentiation of their service road maps, as relevant to the four use cases under evaluation, with an emphasis on self-service, automated IT operations management and overall feature set.

Business Model: Providers were evaluated on their overall value proposition and their strategy for providing solutions for the use cases under consideration, not just raw infrastructure elements. This included evaluating how public cloud IaaS fits into their broader product portfolio and product strategy.

Vertical/Industry Strategy: Providers were evaluated on their ability to offer targeted services for particular verticals, such as government, biotech, media and entertainment, and retail. This includes sales and marketing to such verticals, their ability to meet specialized compliance needs, and vertical-specific solutions.

Innovation: Providers were evaluated on the level of investment in the future of their business, and the quality of those investments, whether financial or human capital; this includes aspects such as the deployment of engineering resources, investments in new technology, mergers and acquisitions, and partnerships and alliances.

Geographic Strategy: Providers were evaluated on their ability to expand their offering beyond their home region, serving the needs of multinational businesses, as well as adapting their offerings to other geographies. In particular, this included their strategy for international sales and support, as well as their data center footprint and internationalization efforts.

Table 2. Completeness of Vision Evaluation Criteria

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

Source: Gartner (December 2011)

Leaders

Leaders have distinguished themselves by offering an excellent service and having an ambitious future road map. They usually serve a broad range of use cases well, although they do not excel in all areas, and they are not necessarily the best providers for a specific need. They have a track record of

successful delivery, along with many referenceable customers.

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Challengers

Challengers deliver a good service that is targeted at a particular set of use cases; they have a track record of successful delivery and referenceable customers. They typically have a road map that is well focused on the customer segments that they serve, but it is not broadly ambitious, although they are making significant investments in the business.

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Visionaries

Visionaries have a highly ambitious vision of the future, and are making significant investments in the development of unique technologies, but the service that they deliver today is best for a narrow range of use cases.

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Niche Players

Niche Players are typically relatively new entrants to the market. They may be excellent providers for the use cases in which they specialize. Not all these providers have a well-established track record, and some of them have limited experience serving enterprise customers.

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Vendor Strengths and Cautions

AMAZON WEB SERVICES

Amazon Web Services (AWS) is a cloud-IaaS-focused vendor with a very pure vision of highly automated, inexpensive, commodity infrastructure, bought without any need to commit to a contract. Its paid-by-the-VM public cloud compute IaaS offering is the Elastic Compute Cloud (EC2), a Xen-virtualized infrastructure. It has data centers in the U.S., Ireland, Singapore and Japan, along with one region that is dedicated to the U.S. federal government. It also offers cloud storage, a cloud content delivery network (CDN) and a number of PaaS-like services. Amazon is evaluated in greater depth in "Amazon Web Services 2011: Is It Enterprise Ready?"

Strengths

AWS is the market share leader, and a thought leader; it is extraordinarily innovative, exceptionally agile and very responsive to the market. It has the richest IaaS product portfolio, and is constantly expanding its service offerings and reducing its prices.

AWS has by far the largest pool of capacity, which makes it one of the few infrastructures suitable for batch computing, especially those workloads that require short-term provisioning of hundreds of servers at a time. AWS also offers specialized infrastructure options for high-performance computing and big data applications, along with a "spot pricing" market for compute capacity.

AWS emphasizes the needs of developers and provides full API access to its infrastructure; portal capabilities usually follow API capabilities. The API is supported by many third parties that provide associated management tools.

AWS has a very large technology partner ecosystem. Many software vendors have specially licensed and packaged their software to run on EC2, easing deployment and eliminating some of the "headaches" associated with licensing software to run in the cloud.

AWS has obtained many security and compliance-related certifications and audits, including PCI, Statement on Auditing Standards No. 70 (SAS 70) Type II, Statement on Standards for Attestation Engagements No. 16 (SSAE 16), International Organization for Standardization (ISO) 27001, and Federal Information Security Management Act (FISMA) Moderate. Customers may be able to obtain access to audits under a nondisclosure agreement, but cannot conduct their own independent audits.

AWS has multiple "availability zones" (AZs) within its "regions." These AZs are effectively multiple data centers in close proximity to one another. Its services are designed to make it easier to run applications across multiple AZs; customers are responsible for architecting their applications for high availability. However, not all capabilities are available in all regions.

Recommended uses: Cloud-native applications; batch computing; big data applications; e-business hosting; test and development.

Cautions

AWS is a best-effort cloud. It has highly variable storage performance, especially for Elastic Block Store (EBS). Network performance between VMs can also vary significantly. It has the weakest cloud compute SLA of any of the evaluated providers. AWS offers an EC2 availability SLA of 99.95%, evaluated yearly, capping at 10% of that bill; it also requires that the customer run in at least two AZs within the region, and for both AZs to be unavailable, and the SLA is defined very narrowly, purely in terms of connectivity to the VM. The SLA does not include EBS, which most customers use for persistent storage.

AWS positions itself as a price leader, but it charges separately for optional items that are often bundled with competitive offerings. Prospective customers should be careful to model the costs accurately, especially network-related charges, and to normalize comparative costs based on actual compute performance. Only forum-based community support is free — enterprise-class support is a 10% uplift to a customer's entire bill, and it is geared primarily toward technically knowledgeable, expert users.

AWS provides only basic ACLs controlling network access to customer VMs, rather than a full-fledged firewall service, and does not directly provide any additional managed security services. (See "Protecting Sensitive Data in Amazon EC2 Deployments" for details of how to deal with security on AWS.)

AWS does not offer any managed services, although these services are available through partners such as Datapipe. As it expands its service portfolio, it is adding offerings that automate some aspects of infrastructure management, such as its Relational Database Service. However, these services do not provide the core basic functions of the turnkey VDC use case.

AWS does not offer colocation or private network connectivity. However, customers can purchase colocation and private networking in the data centers of select partners (currently Equinix) and obtain an Amazon Direct Connect cross-connect to meet these needs.

AWS has a field sales and solutions engineering organization, but it does not consistently satisfy prospects that need consultative sales. For better terms and conditions, customers should sign an Enterprise Agreement, which is typically a zero-dollar contract. Invoicing is available on request, but AWS's billing reports are difficult to understand and audit.

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AT&T

AT&T is a global telecommunications carrier with a long track record of leadership in the hosting market. Its paid-by-the-VM, public cloud compute IaaS offering, Synaptic Compute as a Service (CaaS), is VMware-virtualized, uses IBM's Cloud Service Provider Platform and is in data centers in the U.S. It also offers cloud storage and a CDN, along with colocation, managed hosting and a utility hosting platform called Synaptic Hosting. It primarily positions Synaptic CaaS as adjunct to those offerings.

Strengths

AT&T has a very strong corporate commitment to cloud computing and a solid track record of successfully operating multitenant virtualized infrastructure. AT&T is offering a diverse array of cloud computing services, and it intends to strongly couple these services with application-fluent networking capabilities. However, in IaaS, AT&T is focused on hybrid cloud environments and using the cloud to augment other services, not pure cloud environments.

Synaptic CaaS is a self-service, best-effort IaaS offering that is competitively priced. AT&T also offers Synaptic Hosting, which is a solid platform for production applications and may be attractive to customers looking for a turnkey VDC service, but this platform strongly emphasizes managed service over self-service.

Recommended uses: Multiple workloads requiring managed services (Synaptic Hosting): cloud experimentation for individuals or small teams, in association with other AT&T services (Synaptic CaaS).

Cautions

Synaptic CaaS is a developer-centric offering, with a relatively low availability SLA of 99.9%. It has an awkward UI. Its API is proprietary and lacks any third-party tool support.

Synaptic CaaS's code base is still in the process of maturing. VM provisioning times are lengthy. Its RBAC is limited to two roles — all privileges and VM start/stop privileges only.

The product split — in both engineering and business model terms — between Synaptic CaaS and Synaptic Hosting prevents AT&T from addressing a range of customer needs from a single platform, and creates barriers to migration between services.

AT&T's IaaS offerings emphasize serving customers with complex needs and managed services requirements, rather than self-service. While Synaptic CaaS can be purchased stand-alone, AT&T typically prefers to sell it with other services.

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BLUELOCK

Bluelock is a small, independent cloud-IaaS-focused provider that targets the midmarket and enterprise. It has a vCloud Datacenter Service for both public and private cloud IaaS, with optional managed services. Its data centers are located in the U.S.

Strengths

Bluelock has a track record of successfully serving a wide range of use cases, including complex and mission-critical needs. It is one of VMware's closest service provider partners, and is usually one of the first service providers to implement new VMware products and version upgrades.

Bluelock has strong multicloud capabilities. In addition to supporting vCloud Connector, it also supports vCloud Global Connect, which allows federation between participating vCloud Datacenter Service providers.

Bluelock has a tool in its portal, called Portfolio, which provides monitoring and is focused on IT financial management of IaaS resources, helping customers to understand where they are spending money and how they can optimize their resource usage.

Recommended uses: E-business hosting; general business applications; test and development.

Cautions

Bluelock is a small provider and, while it is financially stable, its size and excellence of service make it a prime target for acquisition.

Bluelock is trying to compete with much larger vendors, but its more limited engineering resources mean that it has little margin for error in execution if it wants to keep up its pace of innovation.

Bluelock has concentrated on quickly delivering VMware's technologies as services and its road map continues this pattern. It is highly dependent on VMware's release cycles and technological innovation.

Bluelock's data centers are in Indianapolis and Salt Lake City, which are not major network hub cities, and consequently this impacts Internet performance.

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CARPATIA HOSTING

Carpathia Hosting is a small, independent Web hoster with a focus on the midmarket and the government vertical, and an emphasis on compliance solutions. Its public cloud compute IaaS, InstantOn, is Citrix-Xen-virtualized and offered in data centers in the U.S. It also offers private cloud IaaS, community cloud IaaS for the U.S. federal government, cloud storage, colocation and managed hosting.

Strengths

Carpathia's primary differentiator concerns compliance, particularly with FISMA, the Department of

Defense Information Assurance Certification and Accreditation Process (DIACAP), the Health Insurance Portability and Accountability Act (HIPAA) and the Payment Card Industry Data Security Standard (PCI DSS). Carpathia also has certification and accreditation (C&A) services for managing compliance life cycles.

Carpathia is trying to differentiate itself by offering enterprise-class cloud solutions at prices competitive with best-effort cloud providers.

Carpathia's standard cloud solutions are based on Citrix XenServer and it has a strong partnership with Citrix. However, it also offers a VMware-virtualized option, and customers can mix VMware- and Xen-virtualized VMs within InstantOn.

Recommended uses: Solutions that have significant compliance requirements, especially in the public sector.

Cautions

Carpathia is focused on managed services, not self-service. Although it has a capable self-service IaaS offering, most of its customers use IaaS in conjunction with managed hosting.

Carpathia is currently focused on cloud IaaS as a platform for managed hosting services, not on the general-purpose data center infrastructure needs that characterize VDC needs. Because it is strategically committed to offering compliant cloud solutions, it participates in the VDC portion of the market; for instance, it serves as an infrastructure provider partner in some purchase agreement awards for the U.S. federal government's Apps.gov initiative.

Carpathia has limited brand awareness outside public-sector organizations, although it has begun significant investments in marketing to the commercial sector, and the majority of its revenue is derived from commercial customers.

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CSC

CSC is a large, traditional IT outsourcer with a broad range of data center outsourcing capabilities. It offers a vCloud Datacenter Service, VCE Vblock-based cloud IaaS architecture called CloudCompute in three variants — public multitenant in a CSC data center, private single tenant in a CSC data center, and private single tenant in a customer's own data center — along with optional managed services. It also offers a Skytap-based public cloud IaaS (CloudLab), custom private cloud IaaS and managed hosting. CloudCompute is available in multiple data centers in the U.S., as well as in the U.K., Denmark, Luxembourg and Australia.

Strengths

CSC is one of the few providers that have a standardized architecture across both public and private cloud offerings. It has grown very quickly; it is now one of the top five market share leaders in VMware-based public cloud IaaS, and has established a track record of operational success. It has a strong road map focused on bringing enterprise-class IT operations management tools, including automated managed services, to cloud IaaS.

CSC's CloudLab offers a set of features that provides significant value to developers, beyond just raw infrastructure. It supports features such as direct integration with integrated development environments (IDEs), complex network simulation and the ability to "snapshot" the state of multemachine configurations for defect-replication purposes. While this offering is VMware-virtualized, it uses Skytap's software, rather than vCD, and is separate and distinct from the CloudCompute offering.

CSC has developed a portfolio of cloud-related professional services, including Smart Start, a proof-of-concept program intended to help a customer achieve a "quick win" in moving an application onto IaaS. In general, it is generous about offering trials to prospective customers.

Recommended uses: General business applications; test and development; cloud-enabled data center transformation and transition.

Cautions

Cloud computing is driving a radical reinvention of the way that CSC delivers services, including significantly broadening the range of companies that CSC targets with its offerings. The cloud division is run as its own business unit, which gives it greater agility but also sometimes brings it into conflict with its much slower-moving and very conservative parent company. CSC's drive and innovation in this market can easily be threatened by interference from other parts of the company, and it can be impacted by the difficulties facing CSC as an overall corporation.

CSC service and support in hosting have historically been a weakness. While CSC is striving to offer better support for its IaaS offerings, it has a substantial legacy to overcome. The quality of account management is highly variable.

CSC sells its IaaS, including optional managed services, on a standardized rate card with a formal discounting structure. CSC has previously discounted aggressively to win business; customers need to ensure they understand whether or not the price is sustainable on contract renewal.

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DATAPIPE

Datapipe is an independent Web hoster. It offers a hypervisor-neutral cloud IaaS called Stratosphere, in both public and private variants, with optional managed services, in data centers in the U.S., the U.K., Hong Kong and mainland China. It also offers colocation and managed hosting, along with a suite of managed services on top of Amazon Web Services.

Strengths

Datapipe is one of the few hypervisor-neutral IaaS providers. Using the Citrix (formerly Cloud.com) CloudStack platform, it delivers a low-cost Kernel-based VM (KVM)-virtualized tier of service, and a competitively priced VMware-virtualized tier of service, out of a single unified portal.

Datapipe has a set of excellent, innovative services that it calls Managed Cloud, which use Amazon Web Services as the underlying infrastructure, not Stratosphere. Datapipe's other offerings, including Stratosphere, can easily be used in conjunction with Amazon.

Stratosphere offers Amazon-compatible APIs and can be managed via third-party tools that support those APIs.

Recommended uses: Hybrid hosting; supplemental infrastructure in conjunction with the use of

Amazon Web Services.

Cautions

Datapipe strongly emphasizes managed services, not self-service. It typically prefers to sell the Stratosphere public cloud in conjunction with other services, and it generally recommends Amazon's solutions rather than its own to customers with self-service needs that can be successfully met by Amazon Web Services' portfolio.

Although Datapipe has offered Stratosphere for several years, primarily as a private cloud, the CloudStack-based offering is new and does not have an established track record in the market.

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GOGRID

GoGrid is a small, independent cloud-IaaS-focused provider. It offers Xen-virtualized IaaS as both public cloud and private cloud, with optional managed services, in U.S. data centers. It also offers cloud storage, a CDN in partnership with EdgeCast, and managed hosting.

Strengths

GoGrid is among the top five public cloud IaaS providers by VM count. Although it has a competitively priced, best-effort, developer-centric IaaS offering, it has excellent SLAs that include 100% availability. It successfully blends self-service IaaS with optional managed services. It is one of the few providers that has a standard architecture across its public and private cloud offerings.

The GoGrid Exchange allows software vendors to license and package their software to run on GoGrid, easing deployment and eliminating some of the headaches associated with licensing software to run in the cloud. It has a unique multipartner compensation model, allowing partners to build on top of each other's software stacks.

Recommended uses: Cloud-native applications; e-business hosting; hybrid hosting with a cloud IaaS emphasis; big data applications; test and development for individuals or small teams.

Cautions

GoGrid's software is developed entirely in-house. This allows it to innovate quickly and to drive down its costs, but also provides significant long-term challenges in competing against providers that can devote significant resources to R&D.

GoGrid's public cloud IaaS offers individual user accounts, rather than hierarchical role-based access control in a unified VDC. Its RBAC is limited to users being superusers, system users (with access to all infrastructure), billing users or read-only portal users.

GoGrid offers only basic ACLs by default; a firewall is available for an additional monthly charge. GoGrid does not offer other managed security services.

GoGrid has its own API, which is supported by a limited number of third-party tools. GoGrid is pursuing a strategy of broader interoperability, and its future success will be dependent on ensuring that it can partake in one or more of the emerging platform ecosystems.

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HOSTING.COM

Hosting.com is a small independent Web hoster with a midmarket focus. Its public cloud IaaS offering is Cloud Enterprise, a VMware-virtualized service offered in U.S. data centers, with optional managed services. It also offers private cloud IaaS, colocation and managed hosting.

Strengths

Hosting.com specializes in cloud-based disaster-recovery solutions and is among the most innovative providers of these solutions. It uses VMware Site Recovery Manager for synchronization and, optionally, EMC RecoverPoint-based storage area network (SAN) replication. It has a cost-effective "parking" feature that allows a VM to run in inactive mode for a fraction of the cost of the normal running of a VM.

Hosting.com has begun to automate its managed services. It is notable for a market-leading workflow-driven automated patch management system. It is also creating a portal-based service catalog. The first such offering is preconfigured Microsoft SharePoint 2010 as a managed service, including the ability to deploy it as a virtual appliance in its cloud.

Hosting.com offers contracting flexibility that uses minimum revenue commitments, but allows customers to move freely between its offerings.

Recommended uses: Cloud-based disaster-recovery solutions, including continuous availability facilitated by using IaaS as a secondary production data center.

Cautions

Hosting.com is in the process of moving upmarket. It still has a limited portfolio of services and lacks breadth of features in its cloud IaaS solutions.

Hosting.com is growing via acquisitions. As a successful provider that has an attractive revenue profile, it is likely to be an acquisition target, although it wants to remain an independent business.

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IBM

IBM is a highly diversified technology company, and its cloud computing strategy extends across its portfolio of products and services. Its paid-by-the-VM public cloud IaaS, SmartCloud Enterprise, is KVM-virtualized; it is offered from data centers in the U.S., Canada, Germany, Singapore and Japan. Although IBM offers colocation, managed hosting and private cloud IaaS, they are not directly integrated with SmartCloud Enterprise.

Strengths

SmartCloud Enterprise is built on top of IBM technologies. When IBM builds private cloud IaaS, it uses the same reference architecture and it intends for SmartCloud Enterprise to integrate easily with those offerings.

Customers that have deep existing investments in IBM technologies, particularly tools in product

lines such as Tivoli, Rational and Jazz, may benefit from its growing number of integration points with such technologies.

IBM is making significant investments in IaaS. In 2011, IBM rebranded its public cloud IaaS offering from Smart Business Development and Test on the IBM Cloud to SmartCloud Enterprise, and it refocused the offering to address a broader range of use cases. It will introduce optional managed services and more enterprise-oriented capabilities in 4Q11.

IBM licenses many of its own software packages on demand and has begun to build an ecosystem of independent software vendor (ISV) partners that also offer their software on SmartCloud Enterprise.

Recommended uses: Organizations that have a deep investment in IBM technologies, with cloud-native applications, test and development, or batch computing needs.

Cautions

SmartCloud Enterprise is, despite the name, a best-effort, developer-centric cloud IaaS oriented toward new, cloud-native applications and test and development needs. It has a relatively low SLA, at 99.9%.

IBM offers forum-based community support by default. Enterprise-class support is a 10% uplift to a customer's entire bill.

IBM is still slowly developing its public cloud IaaS strategy and road map. Although IBM has a broad corporate-wide commitment to cloud computing, its commitment to public cloud IaaS is relatively newfound; we believe that there is little consensus at IBM about its commitment to public cloud IaaS in the future, making it subject to potential major strategic changes in direction and level of investment.

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ILAND

A small, independent Web hoster, iland offers vCloud Powered public and private cloud IaaS, with optional managed services, from data centers in the U.S. and the U.K. It also offers colocation, dedicated hosting and cloud-based hosted virtual desktop services.

Strengths

One of the first service providers to offer a vCloud Powered service, iland has established a track record with it. It was VMware's service provider partner of the year for the Americas in 2010.

It is solution focused. It has historically specialized in disaster-recovery solutions, and offers a portfolio of solutions based on VMware Site Recovery Manager, along with a range of backup and replication solutions. It is one of the few service providers to offer a hosted virtual desktop service on top of either its public or private cloud IaaS.

Recommended use: Cloud IaaS as part of a business continuity solution.

Cautions

While iland uses vCD for its self-service, it will not launch a general-purpose customer portal until 2012 and, consequently, its IaaS feature set is limited to vCD's capabilities and specific managed solutions.

It will be challenged to differentiate itself in a market that is rapidly saturating with vCloud Powered providers that will be introducing offerings in 2012.

As a small but capable service provider, iland is likely to be a potential acquisition target.

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JOYENT

Joyent is a small, independent service provider that is solely focused on cloud services. It offers paid-by-the-VM public cloud IaaS in the form of VMs called SmartMachines, supported via KVM on its Solaris-derived SmartOS. Its data centers are located in the U.S. Joyent also offers Smart Platform, a JavaScript PaaS based on Node.js.

Strengths

Joyent has a strong emphasis on application performance and it takes a holistic approach to its delivery, including integrating network-based acceleration. It has particularly deep portal-based performance analytics, using the DTrace framework for application instrumentation.

Joyent has a unique vision for cloud IaaS and is highly innovative from a technology perspective. It is developing an integrated technology stack and its infrastructure offerings verge into the platform space. It is making deep investments in fundamental technologies, including its own OS, SmartOS, based on Illumos (which is derived from Solaris).

Joyent's SmartMachines are Solaris Containers; KVM runs natively within a container, thus providing additional security, resource control and resource visibility within the virtualization layer.

Recommended use: Cloud-native applications where visibility into application performance is crucial.

Cautions

Joyent's feature set is oriented solely toward the hosting use case. Joyent is missing many features that are part of the offerings of most of the evaluated providers. It does not offer any form of self-service network security. It has a single-account model, without the ability to have additional users beyond the account owner.

Joyent is highly developer centric. It emphasizes API capabilities and the enablement of third-party tools, rather than portal capabilities of its own.

Joyent intends to derive its future revenue from a mix of offering cloud services directly and selling its SmartDataCenter software (Dell is its OEM partner). It must develop an ecosystem around its platform.

When Joyent introduced its KVM-virtualized offering, it introduced a new portal; it is still phasing out the previous portal. This can lead to confusing navigation through its portal and documentation.

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NAVISITE

NaviSite, a Time Warner Cable company, is a Web hoster with a focus on the midmarket and on application hosting. Its VMware-virtualized public cloud IaaS with optional managed services, NaviCloud, is offered in data centers in the U.S. and the UK. It also offers colocation, managed hosting and application management.

Strengths

NaviCloud offers a broad range of self-service functionality coupled with ease of use. It has exceptionally sophisticated hierarchical administration and RBAC that allows the user to customize approval-based workflow.

NaviCloud offers integrated resource monitoring with autoscaling that has options not just for provisioning or deprovisioning VMs, but also for resizing existing running VMs. While many IaaS offerings allow customers to elect to oversubscribe their allocated resource pools, NaviCloud is one of the few that offer self-service resource prioritization.

NaviSite uses NaviCloud as its platform for application hosting as well, and thus supports traditional complex commercial software applications on the platform. This increases the likelihood that customers contemplating a long-term data center migration into IaaS will find that NaviSite already has experience with the enterprise applications they are moving into the cloud.

Recommended uses: General business applications; test and development.

Cautions

NaviSite was acquired by Time Warner Cable in 2011. This has provided the financing to accelerate its business plan, with little interference from its parent, but it is unclear what its long-term strategic fit will be with its parent.

Although NaviSite has one of the most capable cloud IaaS platforms for enterprise workloads, it is not growing as quickly as its competitors that have similar-quality offerings. This may create future challenges in matching the investments that these competitors are making in their services.

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OPSOURCE

OpSource, a Dimension Data company, is a Web hoster that has historically focused on SaaS enablement, but has broadened its target market with cloud services. It offers paid-by-the-VM, VMware-virtualized public cloud IaaS with optional managed services, from data centers in the U.S., the U.K. and France. It also offers managed hosting and a variety of SaaS enablement services.

Strengths

OpSource's offering is designed to compete against best-effort cloud IaaS and vCloud Express offerings, with very aggressive prices. However, it has excellent SLAs, including 100% availability.

OpSource has launched Cloud Software, a set of partnerships with ISVs. It offers OpSource-tested, OpSource-licensed software from those ISVs, on demand, and offers hourly pricing.

Through 2009, OpSource was focused solely on targeting SaaS providers. Its rich suite of offerings for that market includes not only infrastructure, but also an on-demand billing platform, custom application management and help desk support.

Recommended uses: E-business hosting; cloud-native applications; hybrid hosting for SaaS; test and development for individuals or small teams.

Cautions

OpSource was acquired by Dimension Data in 2011. It focuses on its own service business, white-labeling its services for carrier partners and selling its cloud stack software through the Dimension Data channel.

OpSource's feature set is heavily oriented toward the hosting use case. It targets Web applications, not general-purpose workloads.

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RACKSPACE

Rackspace is an independent Web hoster and a publicly traded company. It offers a paid-by-the-VM, Xen-virtualized public cloud IaaS (Cloud Servers) from data centers in the U.S. and the U.K. It also offers managed hosting, hybrid hosting (RackConnect), private cloud IaaS, cloud storage (Cloud Files and JungleDisk), cloud PaaS (Cloud Sites, formerly known as Mosso), cloud monitoring (CloudKick), hosted virtual desktop and SaaS (email and SharePoint). It is the primary sponsor of OpenStack, an open-source cloud stack, and its Cloud Builders business provides traditional commercial open-source support and professional services around it.

Strengths

Rackspace Cloud Servers is a straightforward, easy-to-use service, with excellent customer support, and has one of the lowest entry price points, making it attractive for initial experimentation with cloud IaaS.

OpenStack's broad community of participating vendors is likely to make it a key cloud infrastructure ecosystem, in competition with VMware, Microsoft and Amazon. It should eventually allow Rackspace to introduce service enhancements at an improved pace and expand third-party management tools support. (See "Cool Vendors in Open-Source Software, 2011" for more on OpenStack.)

Recommended uses: Hybrid hosting where cloud IaaS is supplemental to a primarily dedicated infrastructure; test and development for individual developers and small teams, where simplicity and ease of use are critical attributes.

Cautions

Rackspace Cloud Servers is a developer-centric best-effort IaaS, and its feature set is oriented solely toward the hosting use case. It is missing many features that are part of the offerings of most of the evaluated providers. It does not offer any form of self-service network security (other than to hybrid hosting customers). It has a single-account model, with no ability to have additional users beyond the account owner.

Rackspace intends to migrate Cloud Servers from its current proprietary cloud compute stack to an

OpenStack-based offering, but will not do so until mid-2012. Until then, it is making few enhancements to Cloud Servers.

Rackspace has a diverse set of cloud-related businesses and will be challenged to manage the broad range of demands on its management team and its engineering resources. Despite having the second-largest market share in public cloud IaaS, and deep investment in its cloud business, it has a poor track record of releasing cloud features at a market-competitive pace.

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SAVVIS

Savvis, a CenturyLink company, is a Web hoster with a long track record of leadership in the hosting market. It has a suite of both public and private VMware-virtualized IaaS offerings, including Symphony Virtual Private Data Center (VPDC), its self-service public cloud IaaS with optional managed services, offered in data centers in the U.S., the U.K. and Singapore. It also offers colocation and managed hosting.

Strengths

Symphony VPDC is offered in multiple service tiers, with differing price points, SLAs, included features and included managed services. Regardless of the service tier or other services purchased from Savvis, there is a single unified management portal. It has established a good track record in a short time and is now among the top five market share leaders for VMware-virtualized public cloud IaaS.

Most Web hosters do not offer their managed hosting customer portal to self-service cloud-only customers. Savvis is one of the few that does. Its customer portal has one of the most comprehensive feature sets in the hosting industry and is, consequently, exceptional for the cloud IaaS market.

Symphony VPDC has a solid feature set, with a particular emphasis on broad, deep security features. Savvis has been introducing a variety of automated managed services, including the Symphony Database, an on-demand self-service database solution for Oracle and Microsoft SQL Server.

Recommended uses: General business applications; test and development.

Cautions

Savvis has an extremely diverse product portfolio, with multiple flavors of single-tenant and multitenant IaaS. It can be difficult to decide which solution or combination of solutions is right for one's needs. Customers with hybrid hosting needs are likely to find Savvis' other solutions more suitable than Symphony VPDC for their production environments.

CenturyLink acquired Qwest and Savvis in 2011, and is focused on integrating Qwest. Savvis has been left as a largely unchanged stand-alone entity, except for the integration of Qwest's hosting assets. But once CenturyLink finishes "digesting" Qwest, it may reassess its strategy for its Savvis assets.

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SOFTLAYER

SoftLayer is an independent Web hoster with a focus on small or midsize businesses (SMBs). CloudLayer, its paid-by-the-VM Citrix-Xen-virtualized public cloud IaaS, is offered in data centers in the U.S., the Netherlands and Singapore. It also offers cloud storage, a cloud CDN in partnership with Internap, private cloud IaaS, colocation, dedicated hosting and managed hosting.

Strengths

SoftLayer is a thought leader in automated, highly standardized infrastructure services, provisioned on demand. It invests deeply in providing automated managed services. It has an excellent portal, which offers integrated management across all its offerings.

CloudLayer has a particularly clean service composition, with a range of options that can be added on a per-instance, paid-by-the-hour basis, including aspects such as the type of monitoring and the automated response to a failure detected by monitor. Instances can be either VMs or dedicated servers.

CloudLayer has an array of paid-by-the-hour, per-instance security options, including the option to integrate with third-party authentication (such as VeriSign Identity Protection). SoftLayer also offers free vulnerability scanning and PCI compliance scans (in partnership with McAfee).

Recommended uses: E-business hosting; test and development for individual developers and small teams; self-managed hybrid hosting.

Cautions

SoftLayer is strongly focused on self-service for SMB customers, rather than midmarket or enterprise customers that are likely to need more consultative sales, a deeper level of support and greater flexibility from a service provider. Its feature set and road map are also focused on the needs of SMBs.

SoftLayer's API is proprietary, with little in the way of third-party tools support. Notably, neither RightScale nor enStratus currently supports CloudLayer. However, SoftLayer signed a RightScale partnership in November 2011.

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TATA COMMUNICATIONS

Tata Communications is a global telecommunications carrier. InstaCompute, its Citrix-Xen-virtualized public cloud IaaS offering, is available in data centers in India and Singapore. It also offers colocation and managed hosting.

Strengths

InstaCompute is a best-effort IaaS offering, built on top of Citrix (formerly Cloud.com) CloudStack, and it supports the Amazon API. It is very competitively priced and intended to attract customers from the developing world. Although metered by the hour, partial hours of service are prorated.

InstaCompute has a hierarchical account management system that offers both multiple users and

multiple projects. Cost management is integrated into its portal, with configurable spend limits on a per-project and per-user basis, and the ability to configure spending alerts. It also offers a prepaid option.

Customers with Tata Communications' MPLS VPN service can obtain an MPLS VPN connection to InstaCompute at no cost.

Recommended use: Cloud-native applications, or test and development, for cost-conscious customers.

Cautions

InstaCompute is not integrated with the rest of Tata Communications' hosting portfolio and has no optional managed services.

InstaCompute has an SLA equivalent to 99.95% availability, but it has an SLA credit cap of 20% of the customer's monthly bill and the burden is on the customer to prove an outage.

Tata Communications has low brand awareness outside its core network services markets. It is focused on selling to businesses in Asia or to multinational corporations whose global needs include Asia.

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TERREMARK

Terremark, a Verizon company, is the result of Verizon's 2011 acquisition of Terremark, a Web hoster. It has two VMware-virtualized public cloud IaaS offerings — Enterprise Cloud (from the original Terremark) and Computing as a Service (CaaS) (from Verizon) — along with a paid-by-the-VM vCloud Express offering. Enterprise Cloud is available in data centers in the U.S. and the Netherlands; CaaS is also available in Hong Kong. Terremark also offers private cloud IaaS, managed hosting and colocation.

Strengths

Enterprise Cloud is focused on self-service VDC needs. It has a broad range of features, the longest track record in the market for enterprise-class public cloud IaaS and is among the top five market share leaders in VMware-virtualized public cloud IaaS. *Recommended uses:* General business applications; test and development.

CaaS (which will soon be rebranded to Enterprise Cloud Managed Edition) is focused on hybrid hosting and customers that need some managed services with their VDC. It has a competitive feature set and customers can provision not only VMs, but also dedicated servers; however, the metering increment is by the day, rather than by the hour. *Recommended uses:* Hybrid hosting; general business applications.

The vCloud Express offering is targeted at developers and is sometimes used to drive quick proof of concepts for cloud IaaS. It is a best-effort cloud IaaS without guaranteed resource allocations. It exposes the vCloud API, as well as Terremark's own API. *Recommended use:* Test and development for individual developers or small teams.

Cautions

Although the cloud services themselves are operated at a high level of quality, customer service is inconsistent and draws frequent complaints.

While Terremark's multiple IaaS offerings allow it to serve a broader range of use cases, they also split its product portfolio, creating challenges for customers that have a range of needs.

Terremark and the previous Verizon hosting business and managed security assets are in the process of being fully integrated. This process has been highly disruptive to both companies, including the loss of key talent at Terremark.

Although Terremark and Verizon, preacquisition, both independently obtained status as vCloud Datacenter Providers, the vCloud Datacenter Service is offered only as private cloud IaaS.

Although Terremark is a close VMware partner, one of its future strategies is hypervisor neutral, and it intends to pursue its own software development strategy, beginning with the 2011 acquisition of CloudSwitch, a software company specializing in cloud migration.

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TIER 3

Tier 3 is a small, independent service provider that is solely focused on cloud services. It offers paid-by-the-VM, vCloud Powered public cloud IaaS from data centers in the U.S.

Strengths

Tier 3 combines a good set of features on a well-engineered platform, with an easy-to-use self-service portal. Although it is a vCloud Powered offering, its core architecture and software platform contain substantial custom engineering of its own. It is continuously releasing new capabilities.

Tier 3 offers two tiers of VMs, "lab" and "premium," with SLAs of 99.9% and 99.999% availability, respectively. All premium VMs are automatically replicated into a second data center, a unique feature.

Tier 3 has a scriptable templating feature called Blueprints. Blueprints can be used to provision complex, multi-data-center infrastructure configurations incorporating VMs, network elements and applications. For instance, one of Tier 3's provided Blueprints can provision Microsoft Exchange Server HA using data availability groups.

Recommended uses: E-business hosting; cloud-native applications; general business applications; test and development.

Cautions

While Tier 3's offering is vCloud Powered, it does not expose the vCD UI. Consequently, customers do not receive the full extent of vCD's self-service capabilities. However, Tier 3 offers many additional features that are not part of vCD.

Tier 3 is a very small but innovative service provider, with a pure public cloud IaaS business, which makes it a likely target for acquisition.

Tier 3 has limited brand awareness, marketing budget and sales capacity. It will be challenged to grow its business in an increasingly noisy, crowded market.

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VIRTACORE SYSTEMS

Virtacore Systems is a cloud-focused subsidiary of Ikano, which owns a variety of hosting and Internet service providers. It offers a vCloud Express public cloud IaaS offering from data centers in the U.S., as well as private cloud IaaS. Virtacore also offers mass-market hosting through its PowerVPS brand.

Strengths

Virtacore's vCloud Express offering competes with best-effort cloud IaaS offerings and is priced very competitively. Virtacore intends for it to complement its private cloud IaaS offering.

Virtacore has a unified management portal across its cloud IaaS offerings, which is intended to enable workload portability across VMware-virtualized infrastructures.

Recommended uses: Non-mission-critical, small-scale Web applications; test and development.

Cautions

Virtacore's offering is SMB focused. It lacks the depth of features and additional services that organizations deploying more complex applications or migrating a large number of workloads will need. Notably, it does not provide a self-service load balancer, monitoring or VPN access, and its self-service firewall (which uses vShield Edge) provides only ACLs.

Virtacore's vCloud Express offering offers only a guaranteed resource allocation for CPU, not for RAM.

Virtacore is in the process of moving upmarket. It has limited brand awareness and experience in selling to larger enterprises.

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