



# UNLOCKING THE ENTERPRISE CLOUD

How the OpenStack™ Project Eliminates Cloud Lock-In

**A RACKSPACE WHITEPAPER WRITTEN BY:**  
**John Engates, Chief Technology Officer**  
**Robbie J. Wright, Senior Manager,**  
**Enterprise Marketing**

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# ABSTRACT

Cloud computing stands well poised to help enterprises significantly improve their business IT speed, agility and costs. However, the fear of technology “lock-in” – difficulty in efficiently switching cloud hosting providers or platforms due to enterprise size and scale – continues to discourage some large corporations from realizing the benefits of the Cloud. This whitepaper discusses the lock-in enterprises face with cloud computing and how the OpenStack open-source platform can help to eliminate that conundrum. Next, it defines in detail the components and inner workings of OpenStack technology. It concludes by providing basic guidance on how to help successfully evaluate the value of OpenStack technology for the enterprise.

# INTRODUCTION

The OpenStack platform is a new open-source cloud operating system based on technology from Rackspace Cloud Servers and Cloud Files platforms and the NASA Nebula Cloud platform, and contributions from the 50+ organizations participating in the community. Its concept, planning and creation materialized out of a shared interest in building an open-source, massively scalable cloud-computing platform. With broad industry collaboration and support, this open-source platform is emerging as the de-facto open industry standard allowing federation, portability and choice for cloud consumers.

Rackspace, the world’s leading specialist in the hosting and cloud computing industry, was having trouble in helping enterprise customers migrate from – and in some cases, to – other providers. Rackspace noticed that the symptoms they were experiencing stemmed from one problem: lock-in. Due to a lack of standardization in the Cloud, it was nearly impossible to achieve massively scalable, easy-to-implement cloud computing.

But every cloud has a silver lining. Knowing the beauty of cloud computing lies in its flexibility, Rackspace realized the Cloud needed flexibility not just in front-end use, but also in the back-end architecture. The company founded OpenStack, a cloud-computing platform that eliminates lock-in by using an open-source licensing model and therefore allowing the software to be deployed broadly. Developers and participants, including NASA, Citrix and Dell are now jumping onboard to continue to spur further innovation.

Rackspace collaborated with major technology industry leaders to create OpenStack platform, but not just for themselves. Its open-source architecture makes it available to the world. And though organizations of all sizes will realize its benefits, OpenStack provides perhaps the largest impact at enterprise scale. As enterprise IT seeks more cost-effective, flexible and productive computing, OpenStack represents an incredibly powerful business tool by abolishing vendor and technology lock-in.

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47% of IT and business leaders say they are already using cloud computing or are actively researching it, and 20% of businesses will own no IT assets by 2012.<sup>2</sup>

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## THE CLOUD



## PRIVATE CLOUD



## DEDICATED HOSTING



## HYBRID HOSTING

# THE ENTERPRISE CLOUD TODAY

## CLOUD COMPUTING FOR THE ENTERPRISE

Cloud computing is essentially software-powered hardware. The Cloud is a pool of virtualized hardware controlled by software that provides users the ability to provision and decommission resources as efficiently as possible – truly an elastic and instant computing concept. For enterprises, this level of computing flexibility can provide three major benefits: speed, agility and cost. Cloud computing provides resources in a matter of seconds or minutes, as compared to days, weeks or longer for physical infrastructure expansions. Also, it removes the limitations of physical platforms, in that it can theoretically scale infinitely. And cloud computing's utility model allows an enterprise to pay solely for the resources it uses instead of absorbing the sunk cost of physical hardware in the traditional computing model.

These significant advantages are tempting many enterprises to move quickly into cloud computing. According to IDC, 47% of IT and business leaders say they are already using cloud computing or are actively researching it.<sup>1</sup> Additionally, Gartner research predicts that 20% of businesses will own no IT assets by 2012.<sup>2</sup> This rising trend in Cloud adoption can be attributed not just to its overall computing model, but also to its modular implementation options. So while the transition from traditional to cloud computing is taking place, enterprises can switch to the Cloud where applicable and stick with traditional hosting where required. After all, the Cloud is for *everyone*, but not for *everything*.

<sup>1</sup> "Cloud Computing Survey:

IT Leaders See Big Promise, Have Big Security Questions" CIO Magazine, October 2008

<sup>2</sup> "Gartner's Top Predictions for IT Organizations and Users, 2010 and Beyond: A New Balance" Gartner, Inc., December 2009

## TYPES OF CLOUD COMPUTING

The industry has appropriated the term "Cloud" to span many different hosting and even internal virtualization solutions. For our purposes, we will use the following terminology:

- **The Cloud** – often known as the "Public Cloud," an off-premise (hosted), multi-tenant solution that enables a true utility computing model
- **Private Cloud** – single-tenant virtualization solutions hosted either on- or off-premise
- **Dedicated Hosting** – both virtualized and un-virtualized single-tenant computing solutions hosted off-premise
- **Hybrid Hosting** – a mix of the Cloud and Dedicated Hosting/Private Cloud in a solution

Each of these solutions and their hybrid mixture has its own advantages and limitations, making different solutions more appropriate for different use cases. The Cloud offers the most leverage and greatest flexibility to enterprises, but some regulatory bodies have yet to allow it for certain

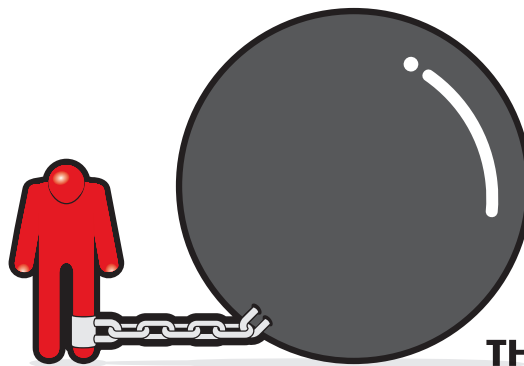
compliance-heavy applications. The Private Cloud makes it easier to address security, privacy, compliance and other risks associated with using multi-tenant, shared resources but typically requires more up-front and ongoing investment for enterprises. Dedicated Hosting typically can help enterprises address their compliance requirements, but is usually more costly, less flexible and slower to adjust for heavy traffic. And finally, as a mixed solution, Hybrid Hosting offers the elasticity of cloud computing along with security of dedicated servers, providing the ability to further optimize the use of computing resources, even within a single application.

Note: The Rackspace whitepaper entitled "Consideration for the Cloud: The Process Every Enterprise Should Think Through" provides additional background information on the subject of cloud computing and hybrid hosting at the enterprise level.

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Switching to another provider or platform often becomes so expensive, difficult and time-consuming that enterprises instead remain locked in to their existing providers, reducing bargaining power and, therefore, the ability to seek greater value.

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## THE FEAR OF LOCK-IN

Cloud computing can resolve the four major issues that enterprise IT environments face today: reliability, availability, scalability and affordability. Its speed, agility and cost allow enterprises to increase capacity on the fly without investing in new infrastructure, training new and existing personnel, and licensing new software.

But even though cloud computing may seem like the ultimate platform for *traffic* flexibility, the closed platforms that some providers offer can reduce an enterprise's *provider* flexibility. The industry refers to this phenomenon as "lock-in." By using a given hosting company's proprietary system or an ISV's proprietary virtualization platform, switching to another provider or platform often becomes so expensive, difficult and time-consuming that enterprises instead remain locked in to their existing providers, reducing bargaining power and, therefore, the ability to seek greater value.

Enterprises fear lock-in because they are concerned first and foremost about integrating with their existing computing resources. They need an IT model that can easily plug into the legacy systems, hardware components, and software applications they have built up over years of computing upgrades. Thus, a cloud computing solution that helps move enterprises toward open federation while remaining portable and easy to implement is paramount to CEOs, CFOs, CIOs and other IT executives.

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The open-source model makes it much easier for an enterprise to adopt and maintain cloud computing by eliminating the time, difficulty and expense of re-architecting IT applications.

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The OpenStack platform provides massive scalability, an engine for innovation and seamless interoperability.

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# THE OPENSTACK PLATFORM FOR THE ENTERPRISE

## HOW IT SOLVES LOCK-IN

The OpenStack Project was created to resolve the enterprise hosting issue of lock-in and promote federation. Its mission is “to produce the ubiquitous open-source cloud computing platform that will meet the needs of public and private cloud providers regardless of size, by being simple to implement and massively scalable.”

To simplify the implementation of cloud computing, the OpenStack platform establishes a standard cloud platform for all hosting providers to use. And by making cloud implementation easier for providers, the OpenStack platform does the same for enterprises. The OpenStack community has effectively created an orchestration standard that allows enterprises to “architect once, deploy anywhere.” The open-source model makes it much easier for an enterprise to adopt and maintain cloud computing by eliminating the time, difficulty and expense of re-architecting IT applications. In contrast to proprietary platforms such as Amazon Web Services and the limited functionality of VMware, the OpenStack platform alleviates lock-in by allowing enterprises to switch hosting providers quicker, easier and cheaper.

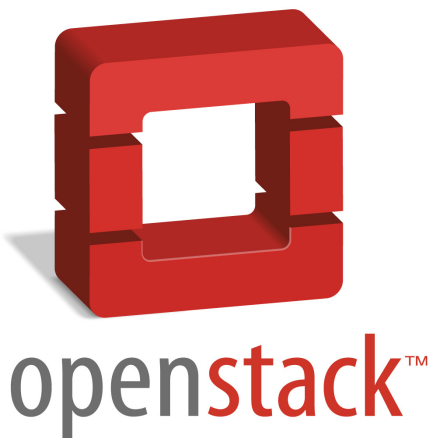
Note: The Rackspace whitepaper entitled “Consideration for the Cloud: The Process Every Enterprise Should Think Through” provides additional background information on the subject of cloud computing and hybrid hosting at the enterprise level.

## OTHER ENTERPRISE ADVANTAGES

The OpenStack platform provides the massive scalability that enterprises demand. While the Cloud generally provides ample space for bursts in Internet and intranet traffic, enterprises deal with much larger amounts of data and users than the average business. Unfortunately for enterprises, most cloud computing platforms simply do not provide the scale and flexibility to meet their needs. However, the OpenStack platform aims to solve this problem. As an extremely large collector of data, NASA needed an open-source cloud platform with the ability to handle massive scale. Thus, the OpenStack platform provides the ability to scale storage in the Cloud not only to accommodate NASA’s astronomical amounts of data, but those of enterprises as well. Additionally, as more and more enterprises discover future scalability enhancements, the OpenStack open-source platform will give all enterprises access to such innovations.

The OpenStack open-source model is an engine for innovation. It brings together individuals and companies in the developer community and gives them a chance to help drive the enterprise cloud forward. And because Rackspace, NASA and Internap are running this platform in production today, the OpenStack platform has a proven track record. This allows the project to attract many very high-quality developers, who will undoubtedly help make great strides in advancing enterprise-level cloud computing. Additionally, it provides enterprises the ability to be involved with the development of the platform by contributing code and submitting fixes that benefit their implementation.

As for interoperability, the OpenStack platform allows enterprises to run workloads in various environments without siloing them off from one another. Regardless of hybrid or public or private cloud implementation, the OpenStack platform gives enterprises the ability to host in-house, at a provider, or both. It alleviates the traditional complexity of such separated systems by enabling them to work together effectively.



## OPENSTACK TECHNOLOGY IN DETAIL

### WHAT IS OPENSTACK TECHNOLOGY?

OpenStack technology is made up of two main components: Compute and Object Storage. Both components work to abstract the physical layer from the application layer. Thus, entire virtual environments that operate just like today's enterprise data centers can be easily built or dismantled. And most importantly, the entire platform is built to run on industry-standard x86 hardware.

OpenStack Compute is an orchestration layer that merges the best of Rackspace's code from Rackspace Cloud Servers and the code behind NASA's Nebula cloud platform. Within it, everything is componentized to allow users to deploy the pieces that are right for them. This prevents enterprises from being forced to use specific load balancers, hypervisors, etc. and gives them the ability to leverage legacy systems. The modular design of OpenStack Compute empowers enterprises to plug in any technology they need and/or want rather than adopt the monolithic and proprietary stack typically pushed by traditional IT vendors.

OpenStack Object Storage is the very same code that powers Rackspace Cloud Files today. In lieu of a central database, it distributes data throughout the system for redundancy. This storage model makes Object Storage massively scalable for enterprise needs, up to multiple petabytes.

The application programming interfaces, or APIs, for OpenStack Compute and Object Storage are both REST based. Also, both APIs originate out of the Rackspace API. So any tools and services that an enterprise has built to run on the Rackspace API will also run on OpenStack.

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The OpenStack platform was designed to be modular and ready to incorporate standard features.

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## BASIC BUSINESS INTEGRATION

In order to work effectively for businesses, OpenStack technology must integrate with other common systems. The OpenStack platform was designed to be modular and ready to incorporate standard features (legacy or new), including the following:

- **User Control Panel**
- **Ticketing System**
- **Network Management**
- **Monitoring Systems**
- **Host Server Management**

## ENTERPRISE INTEGRATION

To refine the OpenStack platform for the enterprise, the community added the ability to simply plug in to common enterprise-level IT systems. These include:

- **Admin Control Panel**
- **User Management**
- **Departmental Accounting Chargeback**
- **Enterprise Software Integration Systems**

## OPENSTACK PARTICIPANTS

Numerous computing companies are signing up to help build upon the OpenStack platform that Rackspace and NASA founded. The list below is a small sampling of the ecosystem participants who are currently adding capabilities:

- Microsoft contributed support for its hypervisor, Hyper-V
- Dell, Intel and AMD are optimizing their hardware to run the OpenStack platform and determining the best specifications to run an OpenStack Cloud
- Citrix added support for XenServer, and is now working on support for VMware ESX
- NTT Data added support for IPv6
- Opscode is writing scripts to support automation

Each of these participants will help integrate the OpenStack platform at the enterprise level. And as more computing product and service providers get involved, the OpenStack platform could become an even better open-source platform for enterprise cloud computing.

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Numerous computing companies are signing up to help build upon the OpenStack platform.

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Today, the Cloud  
is for everyone, but  
not for everything.

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# APPLYING OPENSTACK TECHNOLOGY

## BEST USES FOR CLOUD

Because the OpenStack platform is best applied to cloud computing, an enterprise should first decide how it intends to use the Cloud. As we stated earlier, today the Cloud is for everyone but not for everything. Some businesses use Dedicated Hosting to run databases on dedicated hardware for PCI compliance or because they do not want sensitive data residing on a shared platform. Other applications – for example, web servers and certain SaaS tools – run well in the Cloud because of its elasticity and ability to rapidly scale. The brief, but critical, assessment outlined below can help decision makers quickly determine whether the Cloud is right for a given application. That way, time, resources, money and liability are not invested in an enterprise endeavor that does not provide optimal value.

### To begin, assess the application itself:

- Is the workload I/O intensive?
- Is it latency-sensitive?
- Does it require special treatment for security compliance?
- Is it a legacy, proprietary application or form factor?

If the answer to all of these questions is “no,” the Cloud will likely be a value-added option for an enterprise’s IT strategy.

## BEST USES FOR THE OPENSTACK PLATFORM

In order to provide the maximum flexibility that makes cloud computing so advantageous, enterprises can optimize the OpenStack platform by using it in one of four ways:

- Externally hosted Cloud
- Internally hosted Private Cloud
- Externally hosted Private Cloud
- Hybrid of externally hosted Private Cloud and Cloud

Though OpenStack technology is applicable to any computing platform – Cloud or not – the above list represents the uses in which we believe enterprises could derive the most benefit.

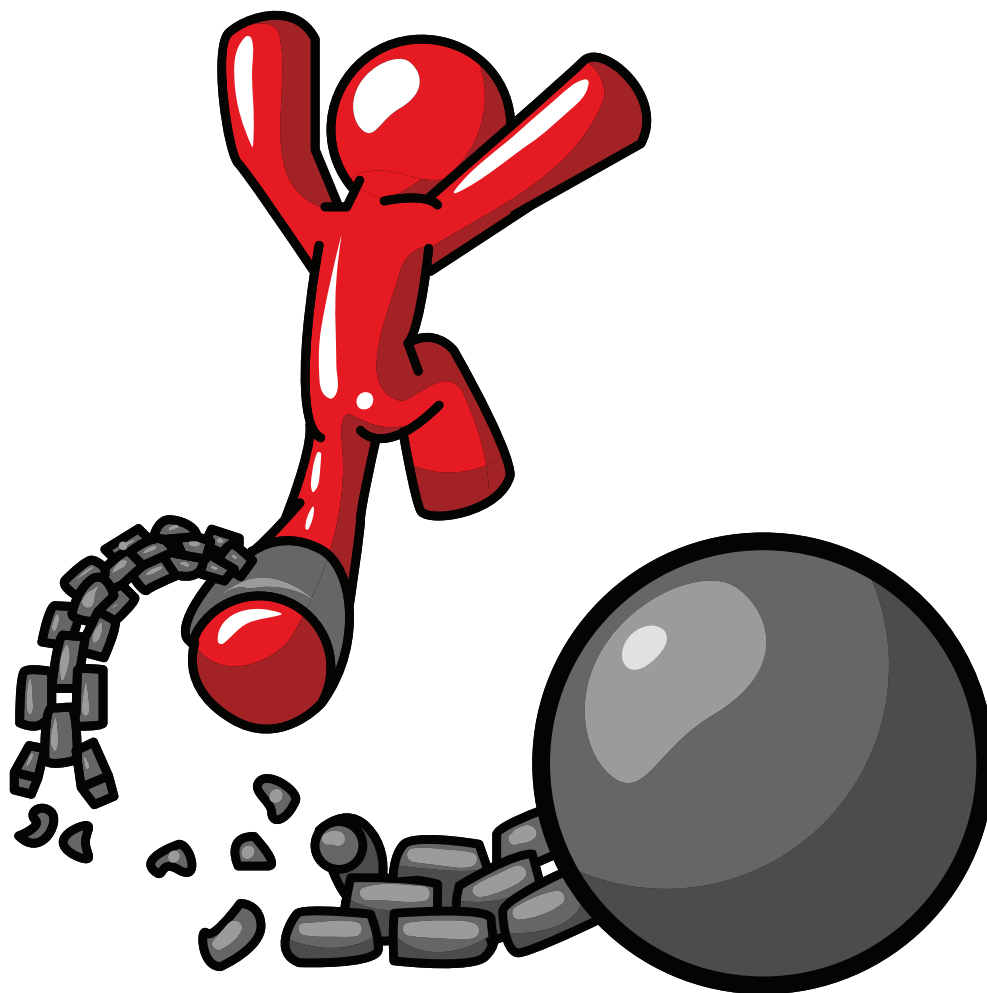
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The OpenStack project's standardization of cloud computing, growing development community and trusted computing providers make it a viable option for enterprises that are considering Cloud adoption.

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## SUMMARY

Cloud computing can potentially provide enterprises with speed, agility and cost-effective IT environments, but the fear of provider and technology lock-in has prevented many enterprises from adopting the Cloud. To remedy this situation, Rackspace founded OpenStack, an open-source community and cloud-computing platform. Its standardization of cloud computing, growing development community and trusted computing providers make it a viable option for enterprises that are considering Cloud adoption. Certain Cloud uses will give enterprises the most benefit from the OpenStack platform, but no matter what its use case the platform provides the same main benefit: ease of integration.



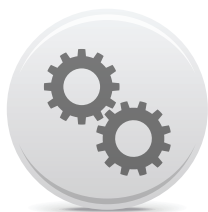
## ABOUT RACKSPACE

Rackspace® Hosting is the world's leading specialist in the hosting and cloud computing industry. Rackspace provides Fanatical Support® service to its customers, across a portfolio of hosted IT services, including Managed Hosting, Cloud Computing, Hybrid Hosting and Email and Apps.



### **OPENSTACK™ TECHNOLOGY: AN OPEN-SOURCE PLATFORM**

To address the issue of platform lock-in across the industry, Rackspace opened the code on cloud infrastructure to provide an open-source platform. The OpenStack™ platform is aimed at providing enterprise IT organizations with the ability to run a common Cloud platform in their own data center or with any hosting provider. This enables a given enterprise to use Public Cloud resources or deploy a Private Cloud for significantly less investment than required for similar solutions in the marketplace. Under this scenario, Rackspace would run its Public Cloud on the OpenStack platform; host an OpenStack private cloud in its data centers for enterprises with the support of the same industry specialists who helped develop the open-source platform.



### **RACKSPACE HYBRID HOSTING**

Whether you require Dedicated Servers and Cloud Servers™ operating independently for different workloads, or a seamlessly integrated architecture for bursting extra compute cycles, Rackspace® Hybrid Hosting allows you to mix and match compute platforms to best suit your needs. Rackspace solutions enable the right fit between application needs and compute platform, and allow enterprises to host entire environments under one roof, reducing the management complexity and cost of their total solution. Using breakthrough technology from F5® and Cisco®, Rackspace RackConnect™ enables seamless integration of Cloud resources serving the solution.



### **CLOUD READINESS ASSESSMENT**

Rackspace provides customized solutions that best fit each individual enterprise's needs. Rackspace has experience in helping its customers leverage Cloud and Hybrid solutions, and helps enterprises in choosing the best solution to service their applications and migrate their platform. To assist in these efforts, Rackspace has developed a Cloud readiness assessment that takes advantage of the knowledge it has collected from migrating hundreds of customers to Cloud and Hybrid solutions. The process looks at multiple factors with technical and operational knowledge to transition enterprises efficiently and effectively.



## FANATICAL SUPPORT®

Exceptional customer service is one thing about Rackspace that differentiates it from other providers. Our culture hires only the most passionate people in order to build one of the world's greatest service companies. This differentiation gives enterprises an ease of doing business with Rackspace. It allows enterprises the collaboration to build the best solution specific to their business, from planning through implementation. And an enterprise's account team at Rackspace is available to the customer's internal IT team – proactive and responsive.



## ALWAYS-ON ENTERPRISE

Rackspace has the performance, scalability, experience and affordability that enterprises demand. Its robust data center and network infrastructure plus critical site monitoring provides for enterprise's sites and applications availability. With the broadest array of hosting solutions, Rackspace® dedicated hosting can be integrated with Cloud solutions for maximum flexibility and on-demand scaling. The company's dedicated LAMPstack and Windows specialists position it at the forefront of cloud computing development in regard to experience and expertise. As for affordability, Rackspace allows enterprises to leverage economies of scale with access to expensive tools and scarce technicians as needed. Additionally, its pay-per-use model in cloud hosting gives enterprises even more cost efficiency.



## SOLUTIONS PORTFOLIO

Rackspace provides enterprise-class services and support for a fraction of the cost of servicing applications internally. This portfolio includes Managed Hosting for dedicated environments, Cloud Hosting for low-cost utility computing, and Hybrid Hosting for the optimal mix of both to provide the most performance at the best value.

# RACKSPACE HOSTING, INC.

### Global Headquarters

5000 Walzem Road  
San Antonio, TX 78218  
Phone: 800-961-2888  
Intl: +1-210-312-4700  
Fax: 210-312-4300  
Online: [www.rackspace.com](http://www.rackspace.com)

### UK Office

Rackspace Ltd.  
5 Millington Road  
Hyde Park Hayes  
Middlesex, UB3 4AZ  
Phone: 0800-988-0100  
Intl: +44 20 8734 2600  
Online: [www.rackspace.co.uk](http://www.rackspace.co.uk)

### BENELUX Office

Rackspace Benelux B.V.  
Teleportboulevard 110  
1043 EJ Amsterdam  
Phone: 00800 8899 00 33  
Intl: +31 (0)20 753 3201  
Online: [www.rackspace.nl](http://www.rackspace.nl)

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