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Capitalizing on the Cloud Revolution with OpenStack

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OpenStack was a project originally started by Rackspace and NASA, but it is now governed by the independent OpenStack Foundation. While cloud system software and OpenStack are in their infancy, the long-term implications are huge. Virtualization has given enterprises tremendous cost savings and more agility. Cloud system software is pursuing the next level of that agility by wrapping up the entire datacenter infrastructure into easily consumable software APIs and services.

The following questions were posed by Cloudscaling to Gary Chen, Research Manager for IDC's Cloud and Virtualization System Software, on behalf of Cloudscaling's customers.

Q. What is OpenStack, and why is it growing in importance?

A. OpenStack is an open source software project that enables users to build Infrastructure-as-a-Service (IaaS) clouds. It pools together and virtualizes compute, storage, and network resources and presents these via APIs, in essence building programmable infrastructure.

OpenStack consists of multiple sub-projects that are integrated and tested together. OpenStack also has a process for the incubation and maturation of new projects, many of which are being proposed constantly to expand OpenStack's functionality and possibly take it into new areas such as Platform-as-a-Service. The project is managed by the OpenStack Foundation, an organization created to govern and promote OpenStack. Interest in developing OpenStack has been very high, with broad participation and support from many major IT vendors.

OpenStack delivers key functionality in a market that is moving to a cloud model. For the majority of users, that is going to be a hybrid model where some apps will remain on-premises in a private cloud and some apps will be pushed into the public cloud. OpenStack can be used by public cloud providers to build cloud services or obtained as software by enterprises to build their own private clouds. While there are many other products that can also deliver this functionality, OpenStack is of particular interest because it is open source and has built a large community.

Q. What is the business value of OpenStack to IT organizations?

A. OpenStack private clouds can help enterprises with business strategy and competitive advantage in the following ways:

- Agility – Most enterprises would point to agility as the top driver for private cloud. Cloud brings unprecedented speed and flexibility to IT, allowing users to get access to

resources faster and respond faster to the business, whether that is getting a new application deployed, a website, a marketing campaign, or a data analysis. Time to market is a critical advantage and cloud can help with the digital aspects of that.

An important aspect in allowing IT to respond faster is automation, which is a key philosophy of true cloud and OpenStack. Look at any of the massive public clouds and Web companies, and you'll see that they automate everything they possibly can and eliminate any manual processes and workflows, which are pervasive in enterprise IT today.

Another key change in the cloud is the operational model. Cloud operations are services driven, where the mindset of IT must be to continuously improve and deploy new cloud services and make them more easily accessible and consumable. Taking this further, DevOps integrates application developers into this process, allowing development and operations to work hand in hand to develop applications faster.

- Cost – Cloud can have varying architectures, and OpenStack was initially modeled after Amazon Web Services. This kind of architecture can reduce infrastructure costs when applications are built and optimized for cloud architecture. One of the primary cost-saving differences is that cloud native applications are built in a distributed scale-out fashion, which puts the burden of availability on the applications, but also allows infrastructure availability to be done differently, focusing on zone availability rather than per VM availability.

  While the public cloud can be cost-effective for temporary and elastic workloads, it can be costly for constant workloads that are run 24x7x365 as compared to a private cloud.

- Control – While there are many use cases for the public cloud, most enterprises will require private cloud for reasons of control and security. Enterprises generally have one or more of the following that will make them keep some portion of their applications and data on-premises:
  - Custom applications that are valuable intellectual property, core to the business and offer competitive advantage
  - Applications with very specific needs (performance, security, etc.)
  - Sensitive data
  - Regulatory compliance requirements

- Lock-in – Lock-in has always been a pervasive issue in IT and has become a bigger concern with cloud. While there is no perfect solution to lock-in, OpenStack can offer some alleviation:
  - While the very large public clouds are certainly impressive offerings, they are limited to a single provider and also generally aren't available as on-premises platforms.
  - In a private cloud, OpenStack will also have multiple software providers to choose from. Different OpenStack implementations have important differences. While moving from one OpenStack environment to another may never be completely seamless, there are still enough similarities that it's an easier migration than moving between disparate platforms.
  - The open source nature of OpenStack ensures that the code, APIs, and process behind them is open and transparent. Community collaboration means that end users along with vendors can influence the project and that the project and technology is steered by meritocracy without vendor agendas. With the OpenStack community growing at a tremendous rate and gaining broad industry support, this will ensure that multiple OpenStack offerings are available in the market and large ecosystem of complementary products.

Q. What workloads run best on OpenStack private IaaS?

A. IT architectures are evolving, and so are the applications driving computing demand. The cloud has characteristics optimized for certain types of applications, such as elastic "bursty" apps (e.g., e-commerce applications at Christmas peaks, ephemeral apps like Facebook promotions, etc.). New cloud architectures are building to a scale-out model instead of a traditional scale-up model, leveraging commodity components and copying innovations first invented by Web companies to provide services at massive scale. Some features of cloud infrastructure and applications include the following:

- Stateless VMs
- Object storage
- Fully routed Layer-3 networks
- Infrastructure zone availability rather than per VM availability
- Distributed applications for scale out and availability, often using message queuing services
- API-driven infrastructure
- Relatively homogeneous systems to enable extreme automation
- Built on commodity hardware

Enterprises face several options in dealing with their current set of applications, which today mostly reside in private datacenters in a virtualized environment. Traditional/legacy applications might ultimately never move to the cloud since the cost / benefit economics are less compelling. Some of these applications may be retrofitted to take advantage of cloud, and there are several frameworks designed expressly for doing this. If the cost of re-writing is greater than the benefit from cloud properties, then these applications are likely to remain on their existing legacy platforms.

However, there is a natural rate at which applications are replaced, and over time, it is expected that many of these applications will default into a new cloud-like environment as they are replaced, either with SaaS applications, applications built on PaaS, or applications deployed on a cloud infrastructure platform like OpenStack. Ultimately some apps will never move, just as many enterprises still rely on mainframe and Unix computing today.

Beyond architectural decisions, enterprises also need to consider their overall usage patterns. Many enterprises want to optimize their private and public cloud costs, and part of this strategy involves identifying the base capacity needed on-premises and then renting the peaks from the public cloud. Another consideration is workload value, which could mean an application that contains valuable IP, core applications fundamental to the business, sensitive data, or having to meet strict regulatory compliance rules. These factors will also be important when deciding which workloads can or cannot be run in an external public cloud.

Q. How should IT organizations get started with OpenStack?

A. OpenStack can be intimidating, but it's getting easier and more approachable very rapidly. Here are some tips if your organization is considering using OpenStack:

- To implement a private OpenStack cloud, begin a pilot. Some OpenStack software vendors may have hosted testbeds that you can try out. Or you can work with these vendors to get a small cloud installed in your organization to become familiar with the deployment process, operations, and get user feedback. Commercial OpenStack

vendors have focused on making OpenStack easier to install, and it's getting easier by the day.

- The OpenStack Foundation maintains a directory of training providers, which will be essential to gaining the OpenStack skills needed to successfully manage an OpenStack cloud. Courses range from shorter overviews to in-depth multi-day classes, both in-person or online.
- Focus on understanding the philosophy, design, and architecture of OpenStack, which will allow you to evaluate your application portfolio better and identify which applications would be the best fit for OpenStack. In addition, it will allow you to understand new options when considering building new applications that have the opportunity to be built cloud-native.
- Look for a commercially supported OpenStack distribution. History has taught us that self-supported open source is not something that's manageable or economical for most enterprises, especially when considering something of the scale, scope, and complexity of OpenStack.

Q. What are potential barriers to adopting OpenStack, and how are these barriers overcome?

A. OpenStack is an exciting new technology, but it faces several challenges when bringing this technology into the enterprise. OpenStack is a new environment and requires new skills. There is a growing number of training offerings and online information available, and the OpenStack Foundation is a good place to start to find them. The OpenStack vendor community and commercial offerings have grown tremendously and these OpenStack vendors can also be a great resource for support and services.

The enterprise market always comes with "baggage" in terms of legacy infrastructure and applications. As discussed previously, architecture will dictate which applications can be migrated to OpenStack and which can't. But also keep in mind that OpenStack is constantly evolving and much of the focus recently has been on legacy enterprise compatibility. OpenStack will get better at running on enterprise hardware and supporting legacy applications, though it will never be 100% and some applications will never be addressable.

One of the challenges in deploying OpenStack is keeping up with the innovation cycle. OpenStack releases every 6 months and today most commercial distributions follow each release. OpenStack is early on in its maturity and this means that each release has major improvements, features, and fixes which motivates upgrades. Eventually over time, upgrades may not have to be done as often, but that is some time away.

To further complicate matters, there is no established process to upgrade OpenStack, making it currently a manual, labor-intensive, and disruptive upgrade. The OpenStack API, however, has stabilized in that it doesn't break unexpectedly anymore as there are processes in place now to create API revision levels and deprecate old interfaces. The upgrade problem is being addressed by both the community and the commercial OpenStack distributors who have a vested interest in making that process smoother. In addition, commercial vendors allow the OpenStack life cycle to be extended past 6 months through commercial support offerings. Typically today it's around 12-18 months, which is still relatively short compared to other enterprise software, but will likely grow longer over time.

Other key challenges are interoperability, portability, and lock-in. Different OpenStack implementations are not completely compatible with each other. This could be for several

reasons. Sometimes it is at the underlying storage or network implementation, which OpenStack can't address.

Users should also be aware of the consequences of forking and proprietary add-ons that may make interoperability difficult. It's generally a good idea with open source to stick fairly close to trunk. OpenStack also has some Amazon compatibility. While the question of how compatible to make OpenStack with other clouds has been hotly debated, the reality is that it is going to be a multi-cloud world. While complete compatibility with other clouds cannot easily be achieved, the open source model has probably the best chance of building it if users demand it, without vendor agendas or competitive strategy to get in the way.

ABOUT THIS ANALYST

Gary Chen is Research Manager for IDC's Cloud and Virtualization System Software. In this role, Mr. Chen focuses on server virtualization software and its transformational effect on the larger datacenter ecosystem of systems management, networking, storage, and security. His research also focuses on cloud system software, an extension of virtualization that provides the fundamental infrastructure for clouds.