GreenQloud Accelerates the Market Adoption of a Cleaner Cloud and Offers a Full Cloud Infrastructure Stack Built on Apache CloudStack

The leading provider of green cloud solutions brings users flexibility, customization, and productivity with Apache CloudStack

Founded in 2010, GreenQloud began their journey with the founders of cloud.com by building a prototype platform for a public cloud. GreenQloud chose to build their platform on top of CloudStack because they found many benefits from a fully open source stack to which they could also contribute. GreenQloud was one of the earliest contributors, and is responsible for CloudStack's Amazon EC2™ compatibility.

Today, GreenQloud offers a full cloud infrastructure software stack for private, public and hybrid IaaS compute and storage all the while leading the path to green IT and sustainability. GreenQloud is a cloud solutions company offering standalone private cloud, hybrid cloud and Truly Green™ public cloud computing virtual servers and data storage (IaaS) powered by renewable energy. GreenQloud's cloud services, feature an easy-to-use, self-service web console and advanced, compatible API controls for full automation of IT services.

With the addition of its newest product, QStack, the company now offers cloud solutions for the full market, accelerating the market adoption of cleaner cloud technology, by addressing the needs and concerns of companies who have not yet adopted public cloud computing due to regulatory compliance or investment commitments.

Key Solution Benefits

- Hypervisor agnostic
- Open, flexible and customizable
- Full and open native API
- Brandable self service user interface
- Bare metal and VM support in one console

The Challenge: Providing Affordable and Sustainable Cloud Solutions to Customers

With GreenQloud centered around Iceland's abundant 100% renewable geothermal and hydro energy infrastructure, their mission was to not only address the complexity-of-use and migration hurdles associated with early cloud services but simultaneously address climate change and how cloud computing is affecting it. GreenQloud's public cloud solution helps companies better manage their resources and keep infrastructure costs down while enabling sustainable and eco-friendly business practices. Using GreenQloud's public cloud services, users can view and socially share their data energy metrics and CO2 savings through the dashboard. This valuable information can be incorporated into business sustainability and CSR campaigns.

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The business goal for GreenQloud's new private cloud offering, QStack, which utilizes the same software that GreenQloud built to power its public cloud, is to help companies reach their cloud migration and sustainability goals simultaneously. QStack provides a practical standalone private cloud solution that can be implemented on a company's existing private infrastructure for organizations reticent to use public cloud services due to regulatory compliances, such as government and industry regulations, perceived security concerns or infrastructure investment commitments. QStack can also be implemented as a sustainable hybrid cloud model for customers who are either beginning to adopt or augment infrastructure with public cloud computing. The hybrid model is also perfect for cases where enterprises and organizations with a well-established IT framework aren't able to move all of their infrastructure over to a public cloud. A hybrid cloud solves that by offering customers greater visibility into how their private infrastructure is being used while lending necessary scalability, cost efficiencies, security and flexibility.

Key Solution Benefits

• Standalone Private Cloud or implementation of hybrid/public cloud

• Sustainability-driven public and hybrid cloud solutions

The solution: Offering Green Cloud Solutions for the Full Market Built on Apache CloudStack

GreenQloud has built their full range of cloud solutions on top of Apache CloudStack and various open source technologies. By going this route, GreenQloud is able to offer their customers a full cloud infrastructure stack for private, public and hybrid IaaS compute (virtual machines and bare metal), object storage, user management, chargeback/billing, automation, monitoring and ops analysis with APIs that are compatible with industry standards.

Recognizing fast-changing business demands, GreenQloud now offers QStack to tackle the challenges that entail these priorities. QStack enables companies to utilize the advantages of GreenQloud's renowned public cloud software on their private infrastructure and also allows for burstability into GreenQloud's clean, renewable energy-powered public cloud should the customer need to scale quickly. This hybrid solution allows for a more conservative investment into IT infrastructure, solves the problem of scalability in the face of changing demands, and encourages the adoption of sustainable cloud practices. This enables customers to create a hybrid cloud solution tailored to their specific needs.

GreenQloud has customers in over 80 countries with the majority from the United States, Scandinavia and Western Europe. They consist of enterprise companies, data centers, startups, SaaS video streaming

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platforms, HPC and big data startups, university networks, SMB's, gaming communities and European government research agencies. GreenQloud's typical customer is a company that has a need for greater visibility into server resources, whether VM or bare metal, and flexibility to adapt to changing business needs at the infrastructure level. Many also need an object storage solution and QStack offers this optionally in the same easy-to-use management dashboard.

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> *– Eiríkur Hrafnsson*
> *Founder & COO, GreenQloud*

Organizations with a small operations team are often backlogged with requests for new servers and additional authentication to use certain services. In short, QStack enables a lot more productivity within the company. The operational ability allows for adding a centralized login automation to the platform. This also enables the financial department to automatically separate all of the usage down to individual users, teams, projects or whole departments within the company. GreenQloud took the chargeback usage features and built them into a deployable platform, essentially creating a cloud-in-a-box which can be customized for their customers.

Key benefit: Hypervisor-agnostic

"CloudStack gave GreenQloud a way to solve the hypervisor challenge. It is a huge benefit that CloudStack is hypervisor-independent," says Hrafnsson. In many private or hybrid setting cases, organizations already have an existing infrastructure. With QStack they can deploy it partly on existing infrastructure such as VMware or KVM, and mix and match to just what works best for the customer. "The fact there is bare metal support in CloudStack has been a deciding factor for some of our customers. We tell the customers that QStack is an enhancement of CloudStack," says Hrafnsson.

Key benefit: Full and open native API

"GreenQloud exposes the Apache CloudStack APIs because there are multiple tools out there that are already using the CloudStack API so GreenQloud benefits from less development work to add new features. For example, if you want to run a cluster you could easily use Apache Whirr to directly launch on the Apache CloudStack API," says Hrafnsson. In QStack there are two standard-based APIs which is the CloudStack API and EC2/S3. GreenQloud continues to contribute to the Amazon EC2/S3 compatibility. "In general, there's a huge ecosystem around Apache CloudStack and both of these APIs have great support. On the CloudStack side, it's a great API and fairly easy to extend that towards EC2 compatibility," says Hrafnsson.

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Technical Situation

GreenQloud is based in Iceland, using the world's only 100% renewable energy-powered power grid, consisting of 70 percent hydroelectric and 30 percent geothermal energy, to power its public cloud. The cooler climate of Iceland also means that less power is needed to keep servers running due to the lessened need for artificial air-conditioning. This lends significant cost benefits to GreenQloud customers.

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GreenQloud enables its customers to bring their own authentication mechanism (SSO) giving its customers more control over teams, projects and functionalities both from and added to CloudStack. GreenQloud's public cloud services are run out of two tier 3 data centers in Iceland with a good bandwidth backbone going to Denmark, London and the Netherlands, as well as a new availability zone in the Pacific Northwest which will go live in fall of 2014. In 2015, there will be an additional subsea cable coming that will connect Iceland directly to New York.

GreenQloud was able to take CloudStack, add their own extensions including full chargeback billing functionalities, and implement more robust support for bare metal servers. For example, the whole stack can run on KVM or VMware using the support that's in CloudStack. GreenQloud built their own multi-tenant, brand-able web console for all user roles and offers additional services such as object storage. The console enables admins to handle all of the infrastructure setup, daily operations, team user management, domain management and everything from their console was built using Meteor. The reason behind using Meteor was to streamline the user interface for all user roles from admin, infrastructure setup and daily operations, domain, reseller, teams/projects or regular users. QStack melds GreenQloud and Apache CloudStack along with open source projects such as Logstash, Elasticsearch, RabbitMQ and Chef. By using Logstash and Elasticsearch, GreenQloud was able to create built-in central logging management and visual analytics making it a lot more manageable in the private infrastructure.

There is the option to launch QStack as a private cloud or public cloud by spinning up custom Virtual Private Cloud (VPC) web consoles with enhanced enterprise cloud features on the same hardware. In addition, there are improved security features with single sign-on support, multi-factor authentication and the ability for customers to bring their own subnet/IP address range. For example, GreenQloud's customers can bring their own authentication using middleware that connects an Active Directory® implementation to the user system in QStack. In turn, it uses the user system in CloudStack by augmenting that with a lot more features.

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Customers are able to get detailed usage reporting – up to the exact usage per hour with the advanced user and team management. It can be connected to a billing system all the way up to all physical and virtual statistics. In the console, any user or team with permissions can see the whole infrastructure CPU load, networking and additional statistics. Customers will have the ability to easily pinpoint who is the busiest user in the system, which team is using the most resources, or which customer has given the most revenue. The customer will have every log from an alert from CloudStack and all the third party systems in one place.

> The Apache CloudStack APIs are also a big benefit because there are multiple tools out there that are already using the CloudStack API. So, we benefit from less development work on our side to add new features."

GreenQloud continually strives to make major improvements in QStack. The most recent improvement is better bare metal support and improved KVM snapshotting with the ability to connect or have the VNC view without installing agents on the bare metal. There's a more flexible networking model (e.g. elastic IPs) without additional specialized hardware. Normally, you would need Netscaler and other components to be able to supply elastic IPs. QStack has had this support in their public cloud for the past two years.

Looking ahead

GreenQloud will continue to develop and streamline its public cloud offering, which currently includes renewable energy-powered, self-service virtual servers and data storage as well as enterprise-ready VPC (virtual private cloud).

Likewise, QStack is proving to be a viable solution for big data or enterprise companies, research facilities and universities looking to meet various cloud adoption and sustainability goals for 2020. By gaining greater visibility into their infrastructure usage, QStack customers can better plan their cloud strategy to be more efficient, cost effective and ultimately greener.

GreenQloud is also expanding its operations and reach to include availability zones around the world, certify renewable energy-powered data centers as GreenQloud availability zones and offer greater diversity in its offerings to meet the needs of a broader customer base.

In tandem with these objectives, GreenQloud will continue to research and advocate the adoption of cleaner energy resources that can be utilized to reduce the CO_2 footprint of ICT as well as auditing the entire data supply chain to improve environmental impact.

Along with the new Pacific Northwest availability zone, GreenQloud is already staging its next availability zone location and also plans to open its US office in the last quarter of 2014.

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