Infrastructure Wars:
Colocation Vs Cloud

DATA FOUNDRY

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Executive Summary: The Rise of Hybrid Cloud

Market studies indicate cloud adoption has increased significantly in recent years. While numbers vary between cloud studies, they all indicate a continued upward trend in cloud adoption among organizations of varied sizes and industries.

The majority of companies adopting cloud services have chosen to implement a hybrid strategy: a combination of public and private cloud resources. RightScale, a leading cloud management solutions provider, aggregates corporate cloud usage data in an annual report. According to their 2016 State of the Cloud, 71% of companies surveyed adopted a hybrid cloud approach, while the use of a single cloud environment appears to be on the decline.

Another noteworthy statistic (**FIG 1**) is that the adoption of a purely public cloud model has virtually remained static, while adoption of private cloud increased 14% year over year. Private cloud means different things to different companies, but it can generally be defined as a pool of virtualized infrastructure dedicated to one company. All the while this is happening, the colocation market continues to expand, providing a foundation for companies implementing private and hybrid cloud strategies.

An analysis of the colocation market by Research and Markets predicts that growth in the colocation market will continue, with an estimated increase in revenue from $25.7 billion in 2015 to $54 billion by 2020 at a compound annual growth rate of 16%. They also report one of the driving factors for companies using colocation facilities is their support for cloud storage and cloud computing.

When faced with the decision to move some, or all, of their infrastructure to the cloud, companies must conduct a thorough analysis of their workloads to properly compare costs. In this white paper, we discuss unexpected costs companies encounter when switching to public cloud services. We analyze the costs of popular cloud services and average colocation costs. We provide some accounts of companies that considered or tried all-cloud models, but in the end determined it wasn't the most cost-effective solution. We also include discussions with infrastructure experts on why a hybrid cloud model using colocation is the best approach for the majority of organizations.

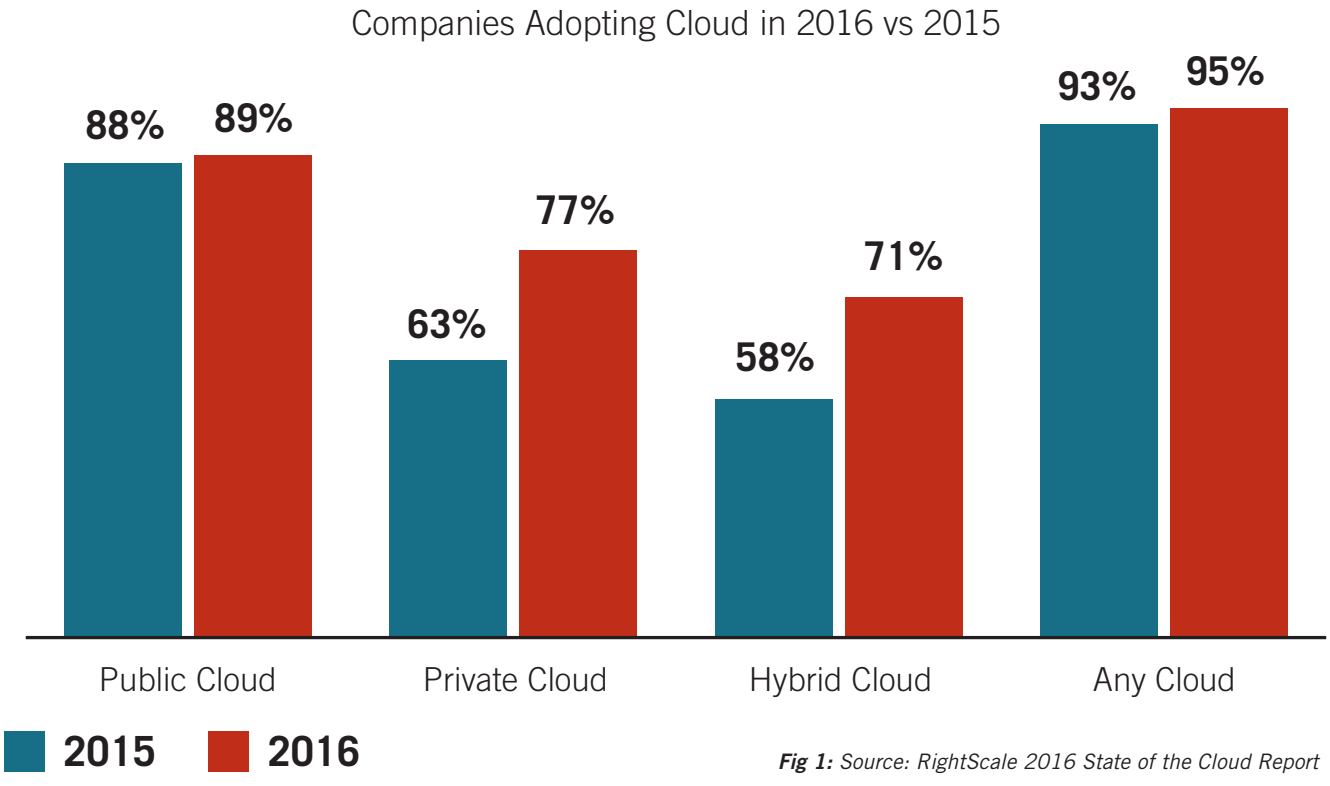


Fig 1: *Source: RightScale 2016 State of the Cloud Report*

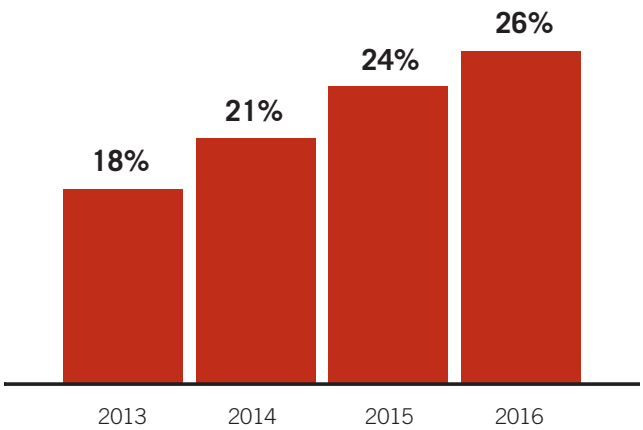
Cloud Jail: What It Is and How It Happens

Companies often encounter unexpected costs when they move their infrastructure to the cloud due to a lack of oversight and lack of control over resources, as well as an overdependence on cloud services.

Avi Freedman, a 10-year veteran of Akamai, former CTO of ServerCentral and founder and CEO of Kentik, an infrastructure and network visibility solutions provider, has been working in networking and infrastructure since the early 90s. Kentik has worked with dozens of web companies, including major e-commerce services and streaming service providers, such as Pandora and Shopify. Familiar with IT infrastructure models for all types of organization, Freedman says that many successful startups started out running all their infrastructure in the cloud. However, he reports that when these companies began to scale, they realized they could not cost-effectively continue down the same path. Freedman has seen companies fail because their cloud costs grew from $20,000 a month to $50,000, and before they knew it they were sending $100,000 to $1 million per month to the cloud. "They were spending more on the cloud than on payroll because they had become too dependent on cloud services and had no infrastructure experts on their operations team to know when to pull back and invest in their own resources," says Freedman.

Many start-ups, understandably, get their feet off the ground by running their infrastructure in the cloud. However, if the company is successful and the business begins to grow, they often find themselves locked into paying outrageous bills from cloud

Respondents Who Say Managing Cloud Costs is a Significant Challenge



Source: RightScale 2016 State of the Cloud Report

providers. They are intrinsically integrated with one or two providers, and their entire business is built on vendors. This is what Freedman calls getting stuck in "cloud jail."

The successful web startups we know today ultimately invested in some of their own infrastructure because they found a hybrid approach using colocation to be the best strategy for their business models.

While cloud jail is a common scenario for startups, it can happen to anyone. Established companies that decide to move everything to the cloud can find themselves in a similar situation if they aren't careful.

Giganews, one of the world's largest Usenet providers, requires significant storage and network resources. Giganews has provided Usenet services since 1994 and has always used colocation for their infrastructure, but the team recently looked into to the costs of cloud-based infrastructure.

Philip Molter, CTO of Giganews and Golden Frog, says a thorough understanding of workloads is essential to accurately estimate cloud costs. He believes visibility can be a problem when it comes to managing cloud resources and shares this insight: "It's easy to lose track of resources in the cloud. Many companies might do the initial cost analysis properly, but what they don't realize is how easy it is to spin up additional resources. Before they know it, costs are out of hand, and they are using more than they really need to use. It requires a lot more effort to manage cloud strategy than to manage colo resources."

This is a growing challenge for IT departments. According to the 2016 State of the Cloud Report, 26% of respondents say managing cloud costs is a significant challenge, and this continues to increase steadily year over year.

Cost Analysis: The Cloud vs Colocation

Because there are so many different cloud services to choose from and so many variations possible for each service, there is no generic public cloud model on which to base a direct cost comparison between colocation and the public cloud. Rather than refer to a single use case to compare racks in a colo against the cost of specific AWS services, we picked some of the most popular AWS services and calculated the monthly costs of each. We also provide a table of average colocation costs.

Use the tables below to get an idea of how much you would spend in the public cloud based on the unique combination of storage and compute resources your company requires. Additional services and pricing options from AWS can be found at: https://aws.amazon.com/pricing/services/.

Recurring costs in the cloud can add up quickly. Companies pay for the time systems are up, and they must pay for all data transferring in and out. Sometimes data transfer costs are included in the cost of the service, and sometimes they are not.

Keep in mind the services priced above are only a portion of the services companies would need if they relied completely on the cloud, such as load balancing, firewalls, monitoring, database management (RDS), encryption key management and DNS services. To provide some perspective, Rightscale reports 76% of cloud spending is on compute resources and 15% is on database, which means storage is a very small percentage of total cost. They also found the majority of enterprises run their cloud instances 24x7.

AMAZON STORAGE

Amazon S3	
50 TB	$1,150/month
200 TB	$4,600/month
500 TB	$10,500/month
1 PB	$21,000/month

**2.1 – 2.3 cents/gigabyte*
**does not include cost of access requests*

Amazon EBS	
50 TB	$5,000/month
200 TB	$20,000/month
500 TB	$50,000/month
1 PB	$100,000/month

**10 cents/gigabyte*

AMAZON COMPUTE

EC2 On Demand					
	vCPU	**Memory (GiB)**	**Instance Storage (GB)**	**Cost/hour***	**Cost/mo****
t2.xlarge	4	16	EBS only	19 cents	$136.80
t2.2xlarge	8	32	EBS only	38 cents	$273.60
m4.large	2	8	EBS only	11 cents	$79.20
m4.xlarge	4	16	EBS only	22 cents	$158.40
m3.large	2	7.5	1 X 32 SSD	13 cents	$93.60
m3.xlarge	4	15	2 X 40 SSD	27 cents	$194.40

**rounded to the nearest cent*
***running 24x7*

AWS also offers reserved instances of EC2 with a one-year contract. Contracting the service in this way can save customers anywhere from 20-40% off the on-demand cost. However, RightScale recently found that only 19% of AWS instances are reserved, which means most companies are paying the higher rate for the convenience of on-demand services.

A common argument for an all-cloud model is that companies don't have to overprovision for hardware; however, companies usually end up overprovisioning resources in the cloud and wasting money. **Rightscale reports 35% of cloud computing spending is wasted on instances that are overprovisioned and not optimized.** They also report, 39% of instance spend

is on VMs that are running at under 40% of CPU and memory utilization, with the majority of those running under 20% utilization.

Freedman and Molter both agree that traditional colocation can be drastically cheaper. When a company doesn't use resources dynamically, they are better able to manage infrastructure costs using colocation. "Kentik uses zero public cloud resources,"

AMAZON NETWORK & CONTENT DELIVERY

NAT Gateway (VPC)	
50 TB	$2,250/month
200 TB	$9,000/month
500 TB	$22,500/month
1 PB	$45,000/month

AVERAGE COLOCATION COSTS/MONTH

Cabinets	Space/Power
5	$3,750
10	$7,500
20	$15,000
50	$37,500

**Prices based on an average of $750 per cabinet. Cabinet costs vary by power density.*

says Freedman. "We use colocation with redundant Internet connectivity. If we were to run all our infrastructure in the cloud, it would cost three times as much."

Because so many aspects of a business are online these days, the cost of public cloud services quickly skyrockets as a company grows. Molter explains, "In most cases, network traffic and data will only increase in volume, and this means costs in the cloud will only go up. "The purchase and management of hard drives and network gear can be preferable to large and unpredictable cloud provider bills every month, especially if needs are well understood," says Molter. "The investment in network and storage resources can be pretty cheap in the long run."

> The majority of VMs in the cloud are running at under 20% utilization.
>
> **—RIGHTSCALE, 2016**

Freedman also weighs in on the high cost of relational database services (RDS) in the cloud: "RDS through Amazon can cost anywhere from 30 cents to $4.64 per hour, when most companies would only need three servers for relational database management, a fraction of the cost to maintain in a colocation facility."

By owning some of their own infrastructure, Freedman and Molter are better able to manage costs; recurring storage, network and compute costs are lower per unit, and unlike resources in the cloud, IT departments are hyper-aware of when and how they are using their own resources. There aren't any surprises when the bill arrives at the end of the month.

> **We use colocation with redundant Internet connectivity. If we were to run all our infrastructure in the cloud, it would cost *three times as much*.**
>
> AVI FREEDMAN, FOUNDER AND CEO, KENTIK

Getting the Best of Both Worlds

The positive correlation between cloud adoption and expansion in the colocation market isn't a mere coincidence. A hybrid approach affords companies the best of both worlds: They can cost-effectively maintain some of their own infrastructure while spinning up resources in the cloud when usage is unpredictable using a redundant and secure connection.

Not only can running infrastructure in a colocation facility be more cost-effective, it also provides a sense of security and control companies don't get when exclusively using the cloud. By housing their equipment in the purpose-built data center of a reputable colocation provider, companies take solace in seeing firsthand the redundant power, cooling and network infrastructure that will keep their equipment up and running 24x7x365. The also get to see the level of security a colocation facility provides and evaluate their security procedures before committing to a contract. In addition to biometric scanners and 24x7 video monitoring, some colocation providers have 24x7 onsite security personnel. By using colocation, companies take advantage of economies of scale to get a level of security and reliability they don't get from the cloud at a fraction of the price they would have to pay if they had their own data center.

For companies looking to free up time to focus on their core business, or have a shortage of IT staff, many colocation providers offer remote hands services that provide assistance with deliveries, equipment installation, hard drive swaps and basic troubleshooting so that companies don't have to send employees to the data center for small tasks. Some colocation providers, such as Data Foundry, offer services that companies won't find in the cloud, like network assessment and network management.

Kentik's Avi Freedman relays the importance of these services, "Many colocation providers offer remote hands services, but if a company is to rely on them, it's important that these remote hands understand routers, switches, disk drives and KVMs. Companies should make it a point to research the skills of a provider's remote hands team. This is especially important if a company doesn't want to retain in-house infrastructure and network experts. Effective network management is essential, and companies won't get it from cloud providers," says Freedman. **"In practice, none of the cloud vendors can be counted on to always resolve your external network performance problems, even if you supply actionable data."**

To support hybrid cloud models, many colocation providers offer direct connections to major cloud providers such as AWS, Azure and Google. This allows colocation customers to use SaaS applications in the public cloud and spin up burst resources when necessary using a secure, direct, low-latency connection. Many businesses require secure, highly-available solutions and look for redundant paths and/or layer two connections to support those requirements, and they find direct connections provided through colocation facilities to be a cost-effective solution.

By implementing a hybrid cloud strategy in a colocation facility, companies like Giganews, Kentik and others can achieve the seemingly elusive balance of reliability, security, cost-effectiveness and flexibility.

About Data Foundry

Data Foundry is a privately held company headquartered in Austin, Texas that provides data center colocation, disaster recovery and managed services for enterprise customers across a variety of industries including energy, healthcare and financial services. The company's premier data centers are supported by experienced onsite technicians, security staff and customer support 24 X 7 X 365. Founded in 1994, Data Foundry was one of the first 50 Internet Service Providers in the United States. Today, Data Foundry owns and operates purpose-built, carrier-neutral data centers in Texas and operates a global network with colocation presences for deployments worldwide.

To learn more about Data Foundry's data centers, go to **www.datafoundry.com**.

To schedule a data center tour, call **888.839.2794**.