GIGAOM RESEARCH

Customer-driven infrastructure: building future-ready consumer applications

David Strom

June 20, 2014

This report is underwritten by Rackspace.

TABLE OF CONTENTS

Executive summary

The days when IT could tell end users which kinds of computing gear to purchase and use ended sometime in the 1990s, but for many years afterwards, IT retained a stranglehold on the deployment and maintenance of enterprise infrastructure, corporate-wide applications, and building data centers. Those days are quickly becoming another memory for IT departments, which have seen the evolution of customer-facing applications and the web- and cloud-based worlds that have arisen. These apps are changing the way that IT delivers its services, builds its enterprise architectures, and selects its systems.

This paper is intended for IT managers and department heads who are looking to evaluate their computing requirements and make the transition to this brave new world of the cloud, mobile, and web-based apps. It will provide a framework for evaluating technology decisions from the perspective of customer experience and suggest metrics that can help businesses justify and benchmark the success of their future IT investments.

Key takeaways of our research include the following:

- The mobile device (phone or tablet) has become the de facto computing endpoint.
- The speed of app delivery is critical.
- The rate of evolution varies tremendously for each business and for departments within each business.
- No monolithic app can drive cloud or customer-facing infrastructure adoption.
- There is also no monolithic or single cloud configuration.
- IT will have to evolve away from installing servers and toward managing integrations, provisioning services, and negotiating vendor relationships.
- Even old-style mainframe apps will become browser-based.
- Availability and disaster recovery needs to be baked into everything on an app-by-app basis.
- Self-service portals are critical.

The journey begins

The quest for customer-facing infrastructure is all about delivering computing choice to users — choices that are celebrated and not merely tolerated. Those days of top-down computing decisions in an IT-owned infrastructure are quickly coming to a close. Newer companies of all stripes deliver their IT infrastructure completely from the cloud. The raised-floor data center (itself an interesting anachronism and holdover from the days when mainframes needed heavy cooling and cabling that ran beneath the floors) has given way to a pipe connecting a corporation to the internet. Modern infrastructure is fluid and situational. IT may not even know where its servers actually are located or which version of code they are running. But more importantly, they may not care.

But the transition extends beyond the server. The endpoint computing device is no longer an exclusive decision that is specified by IT. Today's endpoints include tablets and personal phones that end users want to operate as their principal computing devices. Moreover, end users expect IT to support their device choices too.

A few years ago, the American Red Cross was one of the more conservative IT shops. Most of its apps ran on its own mainframes or were installed on specially provisioned PCs that were under the thumb of the central IT organization based in Washington, D.C. When disaster response teams began to bring personal devices to worksites, they began planning to standardize on mobile platforms, but they were unable to match the pace of change and employee demands. In the end, they realized they needed to relinquish control and migrate to a browser-based app-delivery model. The Red Cross, like many other organizations, learned a costly lesson about the necessity of agile IT. But they are now a much more responsive organization, and as an added benefit, they don't have to buy as many laptops.

This paper will examine the journey toward customer-driven infrastructure from two perspectives: from the standpoint of the apps themselves and from the actual infrastructure that is used to provide those apps.

The evolution of today's enterprise app

The enterprise app is undergoing significant changes in the way it is built, deployed, and updated. The journey toward a customer-facing infrastructure often begins with one of the following events. Not every IT department goes through every event in the same sequence, but these are notable milestones for which businesses should prepare and the thresholds that trigger mainstream enterprise acceptance.

File sharing becomes a collaboration mechanism. The first step toward customer-facing infrastructure usually begins when enterprises realize there is a better way to share files than email or heavy clients such as SharePoint. This is frequently seen in a move toward file-sharing services such as Box or Dropbox or newer, more security-aware services such as SpiderOak or Wuala. These cloud-based services are very easy to use and can instantly share files to people working across the world. They can work well with a variety of device types and have both desktop client and web-based versions too. *Threshold: a dozen users or more*

Cloud-based office productivity apps. Productivity tools were once the exclusive domain of the desktop, but Office 365 and Google Docs have seen tremendous adoption and as endpoints have blossomed into tablets and web-only access. Businesses require a greater degree of collaboration than traditional productivity suites and file-sharing tools can. The next step in the evolution of consumer-facing infrastructure is to have a cloud-based office platform that can enable more subtle ways of collaboration. The transition to creating the bulk of a company's IP in the cloud can be worrisome. When Unisys standardized on Microsoft's Office 365, their CIO had to "calm the lawyers down and explain what the data retention policies were." Still, once that was addressed, they experienced a great deal of success and have been using it successfully ever since. *Threshold: 20 users or more than three office locations*

The irrelevant endpoint device. The particular endpoint, whether it is a desktop or a mobile device, no longer matters. Mobile is being used more and more as the main endpoint browser for consumer applications (nearly half of Facebook posts come from mobile devices and more than 75 percent of tweets are posted from phones), and the enterprise is following.

The ultimate consequence of a bring-your-own-device (BYOD) policy is that the IT department recognizes that the apps it supports trump the devices on which they are running. There are some big benefits for IT. They don't have to invest time in their nanny-state approach in tracking which users are running which endpoints. Instead they can free up these staffers to improve their apps.

School of Rock, which runs music education after-school programs around the country, moved to a BYOD policy for its franchisees. As a result, the amount of time they have invested in keeping track of which apps are provisioned for which particular users has fallen dramatically, and their IT department has been able to reassign its staff to other matters. It's important to note that BYOD does not provide a free ticket to IT management. BYOD requires a fundamentally new approach to application and data security with its own tools and methodologies. It can also have unexpected consequences on other forms of infrastructure. For example, the Red Cross found that the option to work anytime, anywhere generated more requests for additional higher-quality connectivity than remote wireless networks could provide. *Threshold: more than 100 non-corporate-owned cell phones*

Creating an app portal or corporate app store. Once an IT organization is committed to consumer-facing infrastructure, the next step is in delivering a single place where end users can consume the necessary business apps to be productive.

Until a few years ago, the IT staff at Rotary International used a hodgepodge of approaches to manage its more than one million worldwide members. They were saddled with several years of backlogged IT development requests, and members had built a variety of their own apps to compensate and meet their unique local IT needs. Through using Okta's single sign-on tools, they created a portal called MyRotary.org that has more than 50 different apps used by more than 130,000 members. Members can log in once and see everything they need in a single location. Rotary now has a mechanism to scale up these kinds of homegrown efforts and leverage their members. If the app store becomes successful, it can become its own starting point for many end users itself. *Threshold: more than 20 corporate Software-as-a-Service (SaaS) apps*

The automation of key app integration touchpoints. The move toward cloud-based services removes application silos, which in turn allows IT to integrate and automate the flow of data through applications and processes that were outside the initial scope of use. For example, Wessex Water is a regional water and sewer utility in the UK. They used a SaaS-based file-sharing solution from Accellion to create a secure collaboration environment for a wide range of mobile devices. Once they deployed the solution, they realized it could be used in other areas of the organization, streamlining the delivery of other forms of media. For example, contractors use robotic video cameras to capture imagery inside their pipeline with several videos taken every week around their water network. Prior to the switch to Accellion, video surveys would be sent via DVDs that resulted in delays to the process and a potential backlog. This type of automation is essentially "found" productivity and can help offset costs and even create additional revenue centers. *Threshold: more than two corporate-written apps*

The API becomes king. Once customer-centric apps take hold, the APIs supporting them become more important than the individual apps themselves. This is the point at which enterprises build interfaces and custom services that connect multiple apps in novel ways to provide custom value to their users. Done correctly, this can lead toward using data feeds in custom-written apps and using marketplaces such as Microsoft's Azure Marketplace for purchased data services.

HTH Worldwide, an insurance provider based in Radnor, Penn., added workflows, traffic monitors, usage trends, and security features to a suite of apps that are all managed via a set of published interfaces that allow other vendors to integrate their insurance products into their own mobile solutions. Wessex Water used Accellion's APIs to build automated apps that transfer user-created videos into their SharePoint content management system.

These apps support other business workflows too, helping the utility company quickly meet compliance obligations while saving hundreds of work hours per week. This gives them tighter centralized control around who can share content with a full audit trail. Rotary created a series of interfaces around its membership data so that members could access this information without having to worry about security issues or having the right access rights to their centralized grant management systems. This means they can limit who has access to this data yet still allow their members the freedom to build the apps they need for each individual office. *Threshold: more than two corporate-written apps*

The evolution of the cloud

The second half of the story has to do with the location in which these new apps run. This evolution is equally important, and the migration of apps from their own data centers into the cloud deserves our attention. We found that IT shops will make several transitions in their cloud migration. Again, not every enterprise goes through these steps in the same sequence, but here are some things to look for and again some recommended thresholds that can make the transition possible.

1. **On-premises apps running on company-owned physical servers**

   This is still a normal state for many companies, although many others skip this step entirely. While few, if any, businesses can possibly retain this model, it is an important baseline for comparing costs and returns on cloud investments.

2. **In-house hypervisors.** One of the first steps taken by many IT shops is in moving their physical servers to on-premises hypervisors to increase server utilization and densities. *Threshold: more than 20 servers*

3. **A partial move to the public cloud.** Many companies begin their journey by moving a few of the cherished in-house apps such as email into the public cloud. This represents an important beachhead, because it often represents a cultural shift toward relinquishment of IT control over infrastructure and opens the possibility of a business-based app-by-app consideration of cloud services. When walking this path, businesses should remember to implement appropriate access controls so that management and provisioning of cloud services is tightly regulated. They should also take advantage of their recent pre-cloud financial data to compare the cloud's increase in OPEX with the savings in additional CAPEX of new server purchases. *Threshold: $50,000 or more annual email system operations costs*

4. **Building hybrid clouds.** The next step is building a more sophisticated hybrid cloud infrastructure that blends on-premises servers with the cloud, often with firewalls or other security perimeters to segregate internet traffic. The motivation for doing so often originates from the desire to handle bursts in computing or storage demands without putting key corporate assets at risk. For example, Presidio Health migrated their servers to the cloud but kept their data on premises for security and compliance reasons. They were able to increase their computing power by 70 percent without increasing their IT budget and keep their security controls intact. *Threshold: wide variations in seasonal or daily computing loads*

5. **Using co-location facilities or managed cloud-based services .** The final step in the migration process is creating more complex infrastructures that involve a variety of approaches, including co-locations or managed services. There are a number of reasons for going this route, including scalability, performance, and the ability to outsource IT infrastructure management tasks to handle consumer-facing apps. Rotary is using co-location for its disaster-recovery solution. In some cases, enterprises are mixing approaches, using their public clouds to provide a base capacity and then bursting that capacity to a private cloud. *Various thresholds*

Four critical decisions for building your IT infrastructure

These are the key questions to ask as you are trying to evolve your IT infrastructure toward something more consumer-friendly.

1. **Can your current internal apps be converted into something with a web front-end?** This is what the Red Cross did so more of its volunteers could make use of its internal systems without having to carry around anything more sophisticated than a smartphone with a browser. And NxStage built its own web portals for its internal apps that now have thousands of clinicians and other hospital users that are also browser-based. For both companies, this conversion frees up supporting outdated endpoint devices and the need to maintain either customized apps or outdated mainframe terminal communication tools.

2. **Can your business logic be hosted elsewhere and be made more scalable?** If you move your servers to the cloud, you can ramp up (or down) your capacity quickly without having to purchase the hardware. Karmaloop, a large Boston-based clothing e-commerce retailer, has this philosophy. They call it "buying our baseline capacity but renting what we need for handling seasonal spikes."

3. **Can you provide security as a service layer for your apps?** When companies employ a single sign-on tool, they migrate their security needs to a single point of service delivery and make things easier for both end users and their IT department. But a single sign-on isn't sufficient. Security needs to be part of every app, more as security-as-a-service, moving from the network edge to the individual app. This is what Mitsubishi Motors did to connect its North American car dealers to its headquarters infrastructure. In the past, they relied on a VPN to get their users inside a secure perimeter; now each app authenticates each user individually.

4. **Can you virtualize each of your servers without losing performance, security, and reliability?** Gigaom Research has long recommended using CPU utilization as an input to a decision about virtualizing servers. This same criterion can apply to the decision to virtualize existing servers in the cloud, freeing data center resources for more demanding, tightly governed, predictable workloads that must be run in-house or that can provide high levels of consistent demand.

Four key metrics

Any enterprise that is serious about moving toward customer-facing infrastructure must consider the measurement tools and metrics it will use to track its progress. IT needs to treat customer-facing apps differently from traditional infrastructure deployments. Here are some new metrics and methodologies to consider.

1. **What is your response time for issue resolution and other internal support needs?** IT departments have tracked this metric for decades, but customer tolerances have changed. Google, Facebook, and others follow a highly agile, continuous delivery model that pushes a constant stream of updates to users, often on a daily basis. Consumer-facing SaaS vendors have set a new bar, and end users' expectations are now higher for internally developed enterprise apps too. One of the reasons why Engagency chose Rackspace as a managed services provider was that problems were often identified and fixed before IT was even aware of them.

2. **Can you calculate your app-level ROI?** The beauty of the app evolution is that it allows incremental change, adding additional software and integration layers where it makes sense rather than building a huge software infrastructure from the ground up with some grand design. By adjusting the granularity of its metrics, IT can respond more quickly and precisely. As each app is added into the mix, IT should measure those returns before they put any further effort into building out their next enhancement or adding a new app to their stack.

3. **What is your end-to-end app latency?** One of the hardest things to measure and track in a cloud-based paradigm is the end-to-end application latency because so much of the infrastructure now depends on external internet links to apps from suppliers and vendors from all over the world. This means that IT no longer has control over every possible piece of bandwidth. Compounding this issue, traditional latency measurement tools, such as pinging routers and examining traceroutes, don't necessarily provide a picture of what customers are actually experiencing.

   The best way to measure and understand app latency is to measure the performance using the same protocols that the applications use, such as HTTP, FTP, and so forth. There are a number of tools for this purpose, including Azul Systems' Zing and WebPageTest.org.

4. **What is the frequency of overall infrastructure outages?** Oakley Sunglasses chose their web-hosting provider based on one metric: the number of outages over the past year. Particularly for e-commerce companies, having a website that isn't up and running means they are losing business. As IT organizations migrate more infrastructure into the cloud, this reliability becomes important.

The appendix contains two case studies that provide more detail about how businesses have built their customer-facing infrastructures.

Key takeaways

- **It is all about speed.** Customers don't expect quick responses anymore; they demand rapid access to information and their computing environment.
- **The rate of evolution varies tremendously** for each business and for departments within each business. There are several factors that can speed up or slow down this pace.
- **There is no monolithic app** that can drive cloud or customer-facing infrastructure adoption. Businesses come to this junction from different places and for different reasons. Some want to cut costs, improve response times, widen their support toward more mobile endpoints, or reduce application development times. What is clear is that businesses will have to rethink the ways that they deliver their apps to their users in the future. No one provider can deliver the complete package. Even traditional mainframe apps aren't immune and are being integrated with web front-ends.
- **There is also no monolithic cloud situation** or a single cloud implementation either. Businesses come to the cloud for different reasons and evolve into a mixture of public, private, hybrid, co-located, managed, and outsourced situations. That is the beauty and the challenge of the cloud.
- **The mobile device (phone or tablet) has become the de facto computing endpoint.** This means that enterprises have to become more agile about supporting company-wide apps on these devices and understand how quickly these devices are evolving and improving.
- **IT staff will have to evolve toward managing integrations, provisioning services, and negotiating vendor relationships.** They will have to examine business processes from a wider lens and understand how customer-facing apps will play in this new arena. IT staff will also need to become more collaborative and work closer with their end users.
- **Availability and disaster recovery needs to be baked into everything** on an app-by-app basis. Since more computing is happening in the cloud, that infrastructure has to be as reliable as possible.
- **Self-service portals are critical.** Users don't want to wait on IT to be activated, on-boarded, installed, or supported. They just want to log in (only once, please!), download their apps, and get started.

Appendix 1: Case study: Engagency.com

Engagency.com is a 12-year-old company that provides consulting, training, implementation, and managed services for enterprise web content, e-commerce, and digital marketing solutions based on the Sitecore management platform. A key component of their business is advising customers about the appropriate hosting infrastructure and support services needed to effectively manage large mission-critical web properties. Engagency is dedicated to solutions that offer maximum uptime and preserve business continuity. For this reason, Engagency did not recommend that their customers use a cloud provider to host Sitecore solutions until a year ago, when they partnered with Rackspace.

Once they were comfortable with the performance and reliability Rackspace's cloud services provided, Engagency was able to offer significantly broader options to its customers. One example is the manner in which they recommend particular hardware and software configurations to support Sitecore installations. Since a single instance of Sitecore can manage thousands of websites, it can be extremely resource-intensive, requiring specific bandwidth and machine tolerances.

Engagency uses its understanding of these elements to make recommendations about the most appropriate and effective use of cloud offerings and also to find providers that understand managing these kinds of installations. They frequently recommend a hybrid approach that mixes physical hardware and cloud offerings. This combination gives the customer the best of both worlds in terms of reliability and cost savings. However, the cloud is not just about reducing capital cost expenditures. In fact, the greatest benefit seems to be how it is allowing companies to optimize their operating costs by giving them back the budget to reallocate toward round-the-clock managed support services, which in turn maximizes their system performance and reliability while minimizing the strain and undue burden of responsibility on their internal IT team.

As the demands of keeping a mission-critical website continuously in operation have gone up, Engagency has seen an increased need for cloud offerings combined with managed support and monitoring services. The challenge in finding the right partner was that many cloud providers just offer a rack and a pipe at the lowest cost, but Engagency was looking for a provider that offered the value-added support services necessary to ensure maximum business continuity.

For example, when a financial customer experienced a distributed denial-of-service (DDoS) attack on their website, Rackspace played an active role in diagnosing and fixing the problem. From this experience, they recommended a DDoS monitoring service they offered that is now proactively

identifying and helping to prevent such DDoS attacks in the future. Given the number of these kinds of intrusions and attacks, having this kind of support is becoming more important. Combining these types of value-added support services with more cost-effective cloud offerings is helping companies rethink how they address these increasing demands and get more for their money.

Appendix 2: Case study: CrazyForEducation.com

Some organizations have always run their infrastructure in the cloud. This is the strategy that the startup CrazyForEducation.com used when it began its operations last year. The company is a SaaS provider of tutorials and allows K-12 classroom teachers to post short online video lectures to facilitate "flip teaching." These lectures are viewed by students the world over. To deploy their solution, the startup uses a complete online infrastructure. The company is also using a variety of customer-facing apps and SaaS/Infrastructure-as-a-Service (IaaS) infrastructure so they can quickly scale as demand for their services rises. This means there is no single cloud provider that is used, but rather they leverage more than a dozen different vendors for their various infrastructure needs.

When the company began operations, the principals wanted to build their infrastructure incrementally, using a modular approach to build interchangeable parts that could easily connect. They understood that each part could be replaced if the provider went out of business or when they found something more appropriate or cost-effective. As they added new providers, they looked at what the incremental return on their investment would be for that particular tool. In some cases, they found they could build their own tool for less than the monthly cost for one of their providers. In other cases, such as CRM, they found that there were many solid alternatives and that they shouldn't even attempt to build their own.

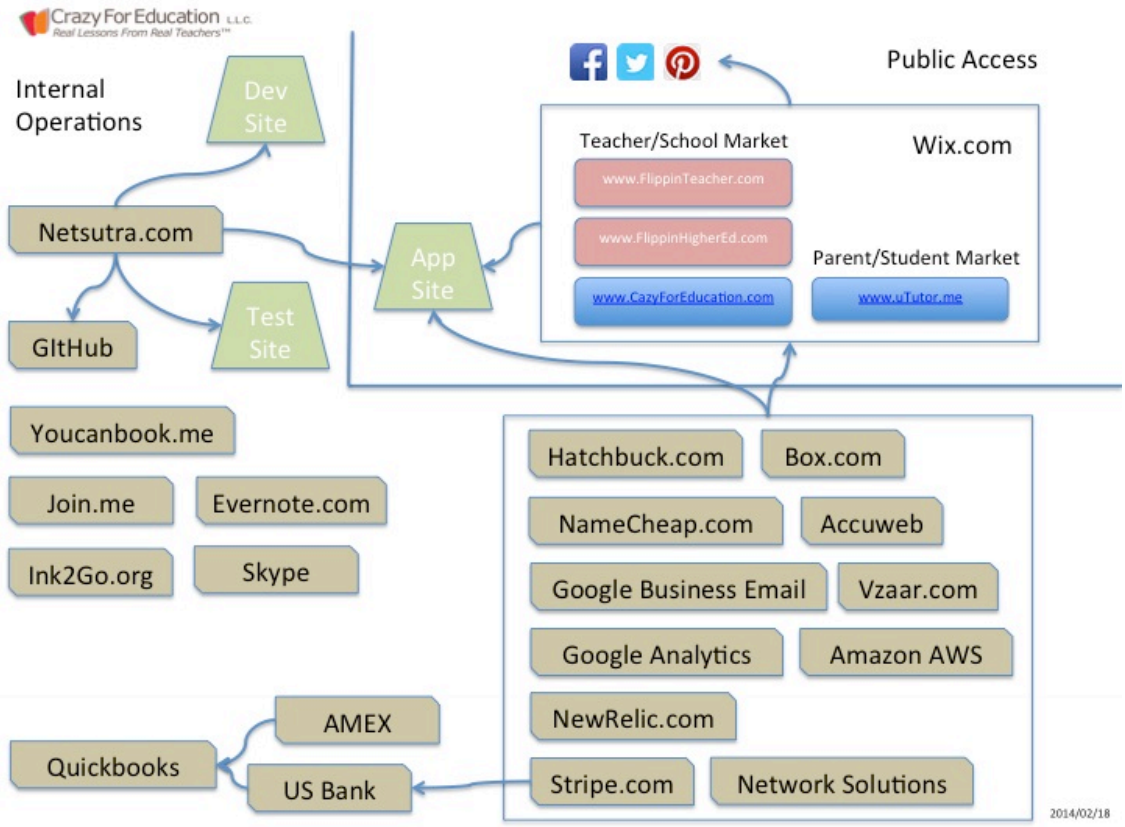
As another example, they needed a solid video-rendering engine since so much of their content was video-related. They looked at a number of providers but eventually ended up using the UK-based provider vzaar.com, which was much less expensive than any American provider they could find.

The firm spends about $1,500 a month on its infrastructure and has purchased services from vendors around the world for its accounting, web hosting, payment processing, and databases. They have chosen more than a dozen different vendors, some of them offering consumer apps and some that are geared toward businesses. As another example, they purchased their email using Google's business-grade hosting service and Box for their file sharing but use join.me for their video conferencing solution.

For each provider, they look at what happens to their performance when they scale up and support more traffic as the company grows. They perform stress testing at 10-times current loads and guarantee that their providers continue to deliver the same latency and performance at that load.

CrazyforEducation.com has also segmented their data security so they don't store customer financial data in the cloud beyond processing credit card transactions when teachers are paid for their video lessons. They originally looked at PayPal but ended up with stripe.com because they had a better and more developed API that could be incorporated into their other programs.

CrazyForEducation internal operations provider diagram



(Source: CrazyforEducation)s

About David Strom

David Strom (@dstrom, strominator.com) is one of the **leading experts on network and internet technologies** and has written and spoken extensively on topics such as VOIP, convergence, email, cloud computing, network management, internet applications, wireless, and web services **for more than 25 years.** He has had several editorial management positions for both print and online properties in the enthusiast, gaming, IT, network, channel, and electronics industries, including the editor-in-chief of *Network Computing* print, DigitalLanding.com, and TomsHardware.com. He began his career working in varying roles in **end-user computing in the IT industry**. Strom has a Master of Science in operations research from **Stanford University** and a BS from **Union College**.

About Gigaom Research

Gigaom Research gives you insider access to expert industry insights on emerging markets. Focused on delivering highly relevant and timely research to the people who need it most, our analysis, reports, and original research come from the most respected voices in the industry. Whether you're beginning to learn about a new market or are an industry insider, Gigaom Research addresses the need for relevant, illuminating insights into the industry's most dynamic markets.

Visit us at: research.gigaom.com.