

Cloud Control: An Essential Guide to Outsourcing Applications

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As we move along the spectrum and consider outsourcing applications from the simple to the very complex, critical tradeoffs need to be made around complexity and control. This paper will examine some common tradeoffs – citing specific cloud applications in the market – whose impact goes beyond mere technical considerations and whose adoption may introduce legal risk, compromise existing business processes or even eliminate some of the efficiencies that modern software services promised to deliver in the first place.

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Clarity in the Clouds

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While it's unclear who coined the term 'cloud computing', it would seem Google CEO, Eric Schmidt first started throwing it around in the summer of 2006, the same month Amazon's EC2 platform was released.[1] By the time Nicholas Carr published his best seller, 'The Big Switch' in January of 2008 the term has been used to describe anything computational and not running on-site.

What is being referenced most often are the software services being delivered to businesses and consumers through multi-tenant platforms (a single instance of a software service running on a group of servers and delivered to multiple organizations or tenants - essentially a shared computer architecture constructed in such a way as to shield each tenant from their neighbors). The software service being delivered is referred to as SaaS or Software-as-a-Service.

Google, Salesforce.com, Microsoft and a host of other multi-tenant vendors deliver software services this way. While all of these companies take a significantly different approach in how they architect their SaaS applications and cloud infrastructures, the one commonality that binds them is the deployment of a centralized, mass computing infrastructure - a 'public cloud' – that provides significant cost savings through economies of scale and pay-per-use billing.

Gone are the huge upfront costs and inefficiencies inherent with the classic client-server model (OS Provisioning, Application Lifecycle Management and Configuration Management). In many cases, what has also disappeared is the breadth of control and flexibility that client-server environments provided. In some cases a host of new concerns have been introduced: What IT managers understand about controlling security, compliance, privacy, performance, availability and the ability to customize applications all change depending on how the particular cloud service has been architected.

In today's economy, what businesses want and need are the cost efficiencies associated with cloud computing combined with the control and complexity that client-server relationships deliver. What they want is Software + Services.

Proof of Concept

Salesforce.com, with their highly popular CRM application and Force.com platform, can legitimately make the claim to be a cloud computing company. No software to install locally

and all services run in a remote, multi-tenanted environment.

Despite the worst economic downturn in memory, this poster-child for cloud computing delivered stellar results in 2008; "Salesforce.com is proud to be the first billion dollar cloud computing company," said Marc Benioff, chairman and CEO, salesforce.com. "At a time when capital is precious, big-ticket software purchases just don't make sense." Salesforce.com – who coined the term SaaS (Software as a Service) - reported fiscal year revenues of approximately \$1.077 billion in 2008, an increase of 44 percent from the prior year. [2]

Complexity and Control through APIs

Salesforce.com boasts that it can deliver a high level of control, customization and integration through its extensive APIs. However there are significant tradeoffs inherent with their approach.

"A task that would take me 10 minutes to complete using .Net and Microsoft SQL Server might take me 5 hours to program through Salesforce.com. There is no standardization. It is a proprietary application," says Maziar Aflatoun, Senior Manager, Web Operations, Exinda Networks. "Beyond that, I don't want to use a cloud service to authenticate users and have it essentially act as my active directory. Not when regular maintenance windows, scheduled to work around North American business hours, cause authentication errors for users on the other side of the globe. Maintenance timing is something I need to control."

Aflatoun has serious hesitations about building a web services foundation for his company around a cloud solution he doesn't feel he can control or easily manage.

SaaS Delivered to the Mass Market through Utility Vendors

On the extreme end of cloud vendors are companies that deliver SaaS applications through what is being referred to as Utility or Grid computing. Nicholas Carr writes about this in his recent novel, 'The Big Switch', in which he draws an analogy between the emergence of electrical utilities at the beginning of the century and the current growth of giant software 'utilities'. By Carr's account, Cloud computing will replace on-site computing for the same reasons electrical utilities replaced on-site power generation: the economies of scale realized from large-scale, centralized infrastructures. He asserts that these saving alone will lure businesses away from their current practices (eg. running software services on site, or through more traditional service providers).

As an example, he regularly cites Google, who for years have been building colossal data centers under a shroud of secrecy. One of the early facilities, built in Dalles, Oregon, was reported to be 34,000 square feet and registered not under Google, but under the name Design LLC. [3]

Since then it has been reported that Google continues to build enormous facilities around the world, including filing a patent for 'water-based data centers' which has been interpreted as floating, off-shore data centers, a concept that brings into question serious issues around security and jurisdiction. [4]

These ambitious plans are not without merit. No one can refute the savings that can be realized from large-scale, centralized computing. Table 1 below indentifies some findings from a recent Berkeley University study that, while glossing over the difference in administrative capacity depending on the application being managed, makes the incontrovertible conclusion that Very Large Data Centers provide significant savings.

Table 1: Economies of scale in 2006 for medium-sized datacenter (1000 servers) vs. very large

datacenter (50,000 servers). [5]

Technology Cost	in Medium-sized DC Cost	in Very Large DC	Ratio
Network	\$95 per Mbit/sec/month	\$13 per Mbit/sec/month	7.1
Storage	\$2.20 per GByte/ month	\$0.40 per GByte / month	5.7
Administration	140 Servers / Administrator	>1000 Servers / Administrator	7.1

This is the same basic economic argument that Wal-Mart exemplifies: namely that scale + volume = reduced costs. But is the utility model capable of delivering the complexity and control businesses need to stay competitive (and compliant)?

Seemingly 'free' consumer applications like Gmail or Facebook put users in the position of not feeling entitled to special features or customizations. Users willingly accept shaky terms and conditions as a tradeoff for a service that is voluntary and free. Of course there is a revenue model associated with these types of applications, typically advertising revenue, and users are collectively helping to pay the bill.

The limits of this tradeoff was tested recently when Facebook users discovered the terms and conditions had been altered without their knowledge, and in such a way that they lost ownership of their data - even after they had cancelled their service. A large outcry from thousands of users ensured this change was reversed but this case underscores the point that the users of some cloud applications unwittingly trade away control of their data. [6]

A similar eruption occurred with the original launch of Google Gmail when the practice of scanning email content for the purpose of inserting targeted advertising was revealed [7]. Users eventually accepted this as the price to pay for 'free' email. Commercial Google app users may have to answer some very complicated legal questions around privacy and compliance if they find their data is floating around in an off-shore barge.

In most cases, for cloud applications delivered on this 'utility' scale, there is little room for customization and even less for control. In order to reduce support costs and achieve tight margins, cloud providers need to lock down functionality and control. Applications are managed through a web-based interface and customizations are not allowed. Conform your business processes, accept blanket legal terms or use something else.

Standardization and conformity was what Nicholas Carr said was required for early electrical utilities to scale and succeed – all appliances needed to conform to a power standard – i.e. 120v or 220v. Are all businesses willing to conform to the same, homogenized software services?

SaaS Delivered through 'Public Cloud' Server Farms

On the other end of the spectrum - furthest away from utility-based applications – are on-site application server installations. Besides negating all the cost benefits that a more centralized infrastructure provides, this option introduces issues that may actually compromise control. "I don't have the resources or the time to build something onsite in such a way that I could provide an internal guarantee that these systems would perform adequately or be highly available. It doesn't make sense when there are hosting companies designed specifically to deliver these services," says Aflatoun.

Modern hosting companies have consolidated over the years, built up significant customer bases and developed large ‘server farms’ that essentially act as public clouds, allowing them to deliver the cost efficiencies that come from large, centralized architectures typical of SaaS deployments. Through replication, clustering and virtual technologies they can deliver the ‘elasticity’ cloud platforms promise as well as pay-per-use billing with no upfront investment.

Businesses can operate their software services in a purely dedicated environment, where all servers are used exclusively by one client, or in a multi-tenant environment. Multi-tenant environments have matured in recent years to the point where some vendors can provide clients a high degree of autonomy in terms of flexibility and control without impacting other tenants or requiring a move to a dedicated environment.

Business-grade email is a great example of a SaaS application that is currently available through a variety of ‘public cloud’ vendors. As Table 2 below illustrates, there exists a number of common trade-offs, as they relate to complexity and control, which need to be considered when outsourcing:

TABLE 2 **PLATFORM**

Requirement	Dedicated	Multi-Tenant	Utility Cloud
Two-factor Authentication	Yes	Uncommon	No
Complex Password Policies (unique to the organization)	Yes	Uncommon	No
Location of Data (eg. Country or traffic routes)	Yes	Yes	No
Custom Terms / Policies / SLAs	Yes	Uncommon	No
Customer Defined Back-up and Offsite Storage Policies	Yes	Some	No
Distributed Architecture (servers on premise in each location to facilitate local continuity or reduce latency)	Yes	No	unknown
Disclaimers / Templated Signature Files	Yes	Some	No
Archiving (for compliance)	Yes	Some	Some
Choice of Archiving Vendors and Methods	Yes	Uncommon	No
GPO: Custom Group Policies	Yes	Uncommon	No
Telephony Integration	Yes	Some	No
CRM Integration	Yes	Some	Some
BES Admin (Custom BlackBerry Enterprise Server Policies)	Yes	Uncommon	No
Send as Functionality (send message on behalf of another user)	Yes	Some	No
Single Sign On	Yes	Some	No
Mailbox Restore	Yes	Some	No
Flexible Scheduled Maintenance / Maintenance Timing	Yes	Some	No
SPAM Customization	Yes	Some	No
Messaging Record Management (mailbox retention policies)	Yes	Some	No
Custom Reporting	Yes	Some	No
Message Tracking	Yes	Some	No
Email Encryption	Yes	Some	No

As Table 2 demonstrates, using a limited sample of requirements, there are many areas of complexity and control that can be accomplished through a multi-tenant environment, depending on the provider.

Software + Services: Complexity, Control and Cost-efficiencies

Ray Ozzie's now famous internal memo, circulated in October, 2005, set the stage for Microsoft's Software + Services strategy which embraces the ideal of distributed computing and the 'meshing' together of cloud efficiencies, client-side functionality and software service integration. [8]

Microsoft went on to coin 'The Power of Choice' message, meant to articulate why any single strategy – pure cloud or entirely on-premise – was too limiting for IT. Directly, and through its partner community, Microsoft now delivers hybrid solutions, capable of capitalizing on the efficiencies of all available technologies.

Companies like, Ceryx Inc., [the sponsor of this paper] strike a balance between being able to deliver complexity and control with the cost efficiency that comes from a centralized architecture. They offer high-availability Hosted and Managed Microsoft Exchange and Collaboration solutions. As a large vendor, they capitalize on the economies of scale that a centralized infrastructure provides and are able to deliver control through a well-designed control panel, a flexible platform and a high-touch support department.

Ceryx has taken a unique approach to delivering application complexity without adding administrative complexity. In addition to developing APIs to facilitate high-level integration, like they have done with partner billing systems, Ceryx has developed a control panel specifically designed for the administrator of large companies. This control panel [Ceryx Customer Center or CC] codifies and automates complex admin functions. Where before, complex and sensitive tasks like password policy management was the exclusive domain of senior IT personal, the Ceryx control panel allows administrators – should they choose – to push complex tasks to non-IT personnel. Moreover, staff does not require retraining when Microsoft introduces new versions of the product and administrative scripting technologies like Powershell.

A layer of abstraction between direct server access and the administrator also means that any errors can be reversed as quickly as they are made.

The need for control isn't limited to product features and functionality. Messaging application control should include the ability to maintain compliance. Ceryx and many other 'cloud' vendors provide archiving for the purposes of compliance, but archiving is only part of the story. What can often be more important are audit trails and reports that will identify exactly when users were authenticated and what actions they took. Ceryx provides an array of reporting features – based on the requirements of large organizations – that would otherwise take considerably more time for a programmer to generate with direct server access.

This admin-centric approach to managing an outsourced installation of Microsoft Exchange is quite unique from that of many other SaaS Microsoft Exchange vendors who have developed control panels with the end-user in mind. In these cases the lack of control can result in chaos.

"I cannot subscribe to a hosted email solution that would give employees the ability to self manage their accounts. Tasks like increasing the size of their mailbox or adding additional services, should be controlled by administrators" says Robin Bouwhuis Senior Network Administrator, RAND Worldwide. "We have to be able to control our costs."

Of course reducing complexity without limiting control can be a double-edged sword. To maintain high-level administrative control and extend control to non-IT personnel, Ceryx

has developed multiple layers of administration.

While Ceryx attempts to deliver the right balance of control through their CC, they recognize that some control and integration must come from a flexible platform layer. This is an area in which most SaaS vendors will not entertain flexibility.

One of the most common concerns relates to Active Directory synchronization. The concern is not necessarily around 'single sign-on' but the management of company user names and passwords. Echoed in the comments expressed by Maziar Aflatoun, administrators avoid the inefficiency and potential for error that comes from managing multiple user and password directories. To this end, Ceryx has set up user name and password synchronization techniques for individual companies and have automated this process.

For Royal LePage, a Ceryx customer with over 15,000 users on their multi-tenant platform, a custom process was developed that allows them to sync any password changes between their on-site agent portal and password stored in the Ceryx platform.

Of course there are a few situations where security and high-levels of integration mandate a dedicated environment with a dedicated Active Directory. Ceryx operates and manages a dedicated Microsoft Exchange environment for one of the largest property and asset management companies in the world. Beyond the fact that this client had already invested in hardware and purchased EA (Enterprise Agreement) licenses from Microsoft, they required integration with Cisco Unity Servers for the purpose of VOIP as well as integration with a customized MOSS (Microsoft Office SharePoint Server) environment and a variety of other custom applications.

Despite this highly sophisticated environment the client still recognized the virtue of using a public cloud provider like Ceryx where they could capitalize on the perimeter and network security, SPAM management, reporting and other foundation-level efficiencies a centralized architecture provides like advanced monitoring, OS Provisioning, Application Lifecycle Management and Configuration Management.

Strangely, it's becoming more apparent through recent events that operating email on site exposes businesses to risks that otherwise wouldn't exist in an outsourced model. In one case, IT personnel were able to read the personal email of investment bankers and used that insight to make fraudulent trades. As with any on site email system, the local IT staff has open access to every email account in the company – and the ability to hide their tracks. [9]

Finally, one of the most striking shortcomings of cloud computing and utility computing is the lack of people that can be found in the cloud. Like any utility – electrical, gas or telephone – personalized customer service is desired but sadly lacking. In dire situations, when an administrator needs to restore a mailbox, retrieve a critical message or disable the account of a recently dismissed employee, nothing compares to the effectiveness of a trained and responsive help desk.

"The Ceryx control panel allowed me to transition from managing a dedicated Lotus Notes Environment to Microsoft Exchange with minimal training – it's an excellent management tool," say Alex Caldwell, IT Manager at Neo Material Technologies. "But as a multi-tasking manager, there are times when I don't have access to the Ceryx control panel and the Ceryx help desk is available 365/24/7 to deal with my issues quickly."

These sentiments capture the urgency and need for control that the administrators of large organizations feel. Utility computing represents an exciting development in IT history. While still in its infancy it will more than likely mature into something much more flexible and complex in the future. Current enthusiasm more than likely represents the extreme swing of the pendulum, with the optimal solution falling somewhere between the cost-effectiveness

that utility or cloud computing can provide and the control a well designed client application can deliver.

Footnotes:

[1] **ZDNet:** <http://blogs.zdnet.com/micro-markets/?p=369>

[2] **Trading Markets:** <http://www.tradingmarkets.com/.site/news/TOP%20STORY/2195983/>

[3] **Computer World:**

<http://www.computerworld.com/action/article.do?command=viewArticleBasic&articleId=9001262>

[4] **Data Center Knowledge** <http://www.datacenterknowledge.com/archives/2008/09/06/google-planning-offshore-data-barges/>

[5] HAMILTON, J. Internet-Scale Service Efficiency In Large-Scale Distributed Systems and Middleware (LADIS) Workshop (September 2008).

[6] **New York Times:** <http://www.nytimes.com/2009/02/17/technology/internet/17facebook.html?em>

[7] **Google Gmail Policy** http://mail.google.com/mail/help/about_privacy.html#targeted_ads

[8] **CNET: Ozzie memo: 'Internet services disruption'** http://news.cnet.com/Ozzie-memo-Internet-services-disruption/2100-1016_3-5942232.html?tag=st.num

[9] **The Globe and Mail**

<http://www.theglobeandmail.com/servlet/story/LAC.20090127.REMAIL27/TPStory/?query=insider+trading>