# THE SURE BUT WINDING ROAD TO THE CLOUD

## AUTHOR

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Even for companies that can afford billions of dollars in IT investments, the economics of putting information technology in the cloud are undeniable. Huge capital expenditures turn into operating expenses, and the headaches and complexities of running secure data centers becomes someone else's responsibility. The testing of crucial but new compute-intensive business capabilities can suddenly be done on the spot, and on the cheap.

This is the reason why The Coca-Cola Company this year has shifted more than 20% of its IT to the cloud and put a for-sale sign on its Atlanta data center.[49] This is also why 207 companies surveyed by JP Morgan with IT budgets of at least $600 million expect to increase their cloud workloads from 16% to 41% in five years.[50] The message is becoming clear—for a growing number of global companies, the default location for their hardware and software will be the cloud. Like the office fax machine and the typing pool, running IT 'on-premises' will soon become a quaint notion for many systems of many companies.

[49] The Wall Street Journal, Cloud Computing Shift Accelerates, Reversing Recent Dip,April 15, 2016, accessed July 15, 2016, http://blogs.wsj.com/cio/2016/04/15/cloud-computing-shift-accelerates-reversing-recent-dip/

[50] Barron's, Amazon Seeing 'Momentous' Change of Guard as Public Cloud 'Booms,' Says JP Morgan, Barron's, April 14, 2016, accessed July 15, 2016, http://blogs.barrons.com/techtraderdaily/2016/04/14/amazon-seeing-momentous-change-of-guard-as-public-cloud-booms-says-jp-morgan

However, transferring a company's computing workload to public cloud vendor facilities promises to be anything but easy. The companies that TCS is helping do so, which include a global chemicals firm, a major business information provider and a large industrial manufacturer, are immediately confronted with two fundamental questions.

1. **WHAT EXACTLY SHOULD COMPANIES MOVE TO THE CLOUD FIRST?**
2. **HOW SHOULD THEY DO SO WITHOUT WREAKING HAVOC ON THEIR DAILY BUSINESS?**

This article addresses these two questions, drawing on our experiences and expertise in helping large companies move their IT to public clouds.

## 1. What Should Move to the Cloud First

The economics of shifting IT to public cloud vendors' data centers are inescapable. Companies that can easily 'lift and shift' long-standing business applications, which consume huge amounts of servers, storage and other data center technology, should be seriously investigating their public cloud options. Cheered on by their CFOs, they will be able to turn much of their big annual capital expenditures involved in running their data centers into operating expenditures.

Unfortunately, many business applications are not easy to simply 'lift and shift'. A company that decides to move a big enterprise resource planning system (ERP) from its data centers to a public cloud runs the risk of significant disruption to its business when it does so, and thus it needs to plan accordingly. The reason for the disruption is that moving on-premises ERP to an ERP vendor's cloud (Oracle, SAP, etc.) essentially is a new implementation of the technology—an upgrade to the latest version. What is more, most ERP systems, especially those installed years ago, have been significantly modified to suit a company's geographic and industry-specific needs. Much of that customized functionality is not likely to be available in a plain vanilla ERP cloud offering. Thus, shifting on-premises ERP to ERP-in-the-cloud may entail significant customization of the type that may have taken months or years to do with the on-premises version.

A major chemical company has nearly 100 versions of an ERP system in its data centers, and each version has been customized to varying degrees. Moving that system to the cloud is likely to be painful given all the customization that would need to be done on the ERP vendor's latest (cloud) version of the system.

Owing to such extensive customization, some companies have decided not to take their ERP systems directly to a public cloud but rather to a privately owned cloud. One example is Qantas, Australia's largest airline. When it was time to upgrade its on-premises Oracle ERP system, the airline turned to a private cloud implementation. Instead of moving to the latest on-premises version, Qantas took advantage of new functionality, enhancing user experience, in the E-Business Suite 12 through a private cloud. "This was a huge opportunity to streamline and improve performance," said Eric Pona, technology manager for enterprise systems at Qantas.[51]

If the plan is to eventually shift your on-premises ERP platform to the cloud, then the least disruptive way is to shift those parts of the enterprise application that adhere more closely to the standard version sold by the ERP vendor—that is, the modules your firm has not extensively customized. In many companies, these modules are in finance and order management.

[51] Baseline, A New IT Model Takes Flight at Qantas, January 6, 2016, accessed July 18, 2016, http://www.baselinemag.com/it-management/a-new-it-service-model-takes-flight-at-qantas.html

## ENVISIONING THE CRITICAL NEW COMPUTER WORKLOADS OF THE FUTURE

When many companies think about the cloud, they look only at moving applications and IT infrastructure that currently run in their data centers. What they forget are the whole new applications that suddenly become available because the cost of bringing in the technology to run them has fallen to near zero. If your company wants to offer customers a new IT-intensive product or a new digital way of doing business but hesitates because it requires a huge investment in additional IT infrastructure, you need to hesitate no more. This is possible because the cost of that infrastructure today is no longer an issue. You can buy such computing resources by the hour at affordable prices.

An excellent example is how streaming movie and TV programming pioneer Netflix Inc. was able to scale its streaming video business. After launching the business in 2007,[52] the company decided three years later that it needed to move its existing technology to a company that was in the data center business—Amazon Web Services. "With the shift to streaming, our software needs to be much more reliable, redundant, and fault tolerant," wrote Netflix VP of product engineering at the time, John Ciancutti, in a corporate blog post in 2010. "We could have chosen to build out new data centers, build our own redundancy and failover, data synchronization systems, etc. Or, we could opt to write a check to someone else to do that instead." Running what he said was one of the biggest cloud computing environments in the world, Netflix decided its engineers had to focus on "product innovation for the customer experience," adding "that is what differentiates us from our competitors"—not the increasingly complex and costly data center infrastructure behind it.[53]

A major provider of information to businesses is making a big push to the cloud for a similar reason—to give customers better ways for using its data online. Customers want to rapidly analyze the firm's data and in numerous ways, and not wait for the company to do the analysis for them. This means providing customers with sophisticated online tools, which in turn requires extensive computing power. The company is in the process of re-architecting those systems and putting them on a public cloud so that customers can get what they need.

[52] Forbes, Netflix to Stream Live Movies for Free, January 16, 2007, accessed Aug. 10, 2016, http://www.forbes.com/2007/01/15/netflix-free-video-streaming-tech-media-cz_qh_0116netflix.html

[53] Netflix, Four Reasons We Choose Amazon's Cloud as Our Computing Platformi, December 14 2010, accessed August 10, 2016, http://techblog.netflix.com/2010/12/four-reasons-we-choose-amazons-cloud-as.html

Dramatically improving the customer's online experience is also what drove U.S. based financial services and credit card company Capital One Financial Corp. to the cloud. The company's CIO, Rob Alexander, says the company's online banking experience is becoming the most important one for its customers.

"We really need to be great at building amazing digital experiences for our customers," Rob Alexander, CIO at the $20 billion (revenue) company, said in a conference presentation.[54] "We have to be great at building software and data products if we're going to win where banking is going."[55]

To be sure, Netflix, Capital One and the business information provider mentioned above are not the only companies that now find themselves competing in an online world against ferocious online players. Perhaps the best illustration of this is that Netflix's cloud provider Amazon now competes against the company in the world of streaming TV shows and movies. Those business partners in the cloud are now competitors too.

A growing number of other firms in industries ranging from automotive manufacturing and banking to media and travel compete today on the basis of the online products and capabilities that they offer. In the future, car buyers should be expected to increasingly compare cars on the basis of their telematics and 'infotainment' capabilities. For instance, what one manufacturer's onboard GPS system can do that another's cannot do may become a major influence in the buying decision. Like Netflix, Capital One and the business information company we mentioned, automakers too must have the data center resources to compete in a digital-intensive world of online business.

[54] MarketWatch data on Capital One, accessed August 10, 2016, http://www.marketwatch.com/investing/stock/cof/financials

[55] Youtube, AWS re:Invent 2015 Keynote | Rob Alexander, CIO, Capital One, published October 13, 2015, Accessed July 17, 2016, https://www.youtube.com/watch?v=0E90-ExySb8

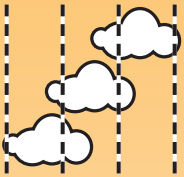
## 2. HOW TO MOVE IT TO THE CLOUD

Once you have determined what existing IT applications and infrastructure your firm should shift to the cloud—and the new IT capabilities that should be built in the cloud from the start—the next big consideration is how to make that shift. Based on our cloud migration work with clients, we believe you are likely to encounter six situations, and urge you to be ready to manage them.

**You will spend at least double the amount of time than you thought to take inventory of your application portfolio.** We call this the 'discovery' phase. To determine what computer applications should be shifted from on-premises systems to the cloud, CIOs must first understand exactly what applications are running in their data centers. From our experience, when a company initially believes it has around 500-600 applications running across its global business, it is often shocked to find out the number is two to three times that many when the audit is done. And we are not including personal applications such as Excel that are housed on PCs or laptops. Many of these extra apps are what are referred to as 'ghost apps' because they are so old that the company that developed them either does not support them anymore or is out of business altogether. Such ghost apps, then, may need to be entirely rewritten to become cloud versions—a major undertaking. Another business information provider that has been shifting to the cloud discovered a ghost app three years ago. The app provided a critical component to managing customer subscriptions. The app vendor had gone out of business long ago. When the information provider began its transition to the cloud, it started with its ERP system and left the ghost app untouched.

**Expect to re-architect a good percentage of cloud applications without having updated design and architecture documents at hand.** For those applications that you have decided must be revamped for the cloud—a new design and a computing architecture—be ready to find that the original documents that explain their design and architecture are either missing or grossly outdated. This is especially true for custom applications built years ago. Three years ago, according to Forrester, companies were spending about the same amount

on custom applications as they were on packaged applications—about 26% for customer apps and 26% for packaged applications out of total spending on applications software.[56] In determining which pieces of the applications portfolio should move to the cloud and when, companies are likely to find that as much as three-quarters of that portfolio are custom applications. That is because many applications were built long ago before viable packaged versions existed. The problem that such packaged software presents is equivalent to the one that science fiction writer Isaac Asimov warned about in his writing on robots: the machinery still works but nobody knows why. Today's business applications are very much in the same condition. There is no one left in the company who can explain how they work.



**To minimize disruptions to the business, cut over in phases defined by business function rather than by data centers.** The easiest way for many IT departments to shift applications and infrastructure to the cloud is to do it one data center at a time. But that often is not the easiest way for a company's business functions to shift their systems to the cloud. Ultimately, a shift to the cloud should be a shift that strengthens a company's business functions and products or service offerings—not just one that reduces the IT cost structure. A marketing function's applications, for example, may reside in multiple data centers. As a result, shifting to the cloud one data center at a time will force marketers to learn, test, and use new cloud-based systems over a long period of time rather than in a concentrated one. Better to identify all the marketing applications that should be put in the cloud, and then plan their migration in a shorter—not extended—period of time. For the IT organization, the data center is the logical unit of work, especially if a firm's data centers are outsourced to third parties. In cloud migrations however, the unit of work should be the business function.

[56] Computerworld, Forrester dispels 'myths' about software industry trends in 2013, August 7, 2013, accessed August 10, 2016, http://www.computerworld.com/article/2484752/it-management/forrester-dispels--myths--about-software-industry-trends-in-2013.html

**In deciding what business functions should go first, determine the connections among applications.** Chances are most applications in a business function are connected to other systems in that function rather than to systems in other functions—other than, of course, those cross-functional ERP systems. Ensure applications that are tightly knotted to other applications are identified and moved concurrently in batches. Functional applications that are integrated with ERP systems should be migrated to the cloud together, so that the business function is not disrupted on two different occasions.

**Recognize the idiosyncratic IT needs of different geographies when determining how to batch the cloud migration.** Data privacy and other information security laws may vary from country to country, and in different continents too. For example, overlooking Europe's rules on employee data privacy may create problems if that data is not kept in the country where a company's on-premises system was located. If you have country-specific applications, put them into a single batch and do them all at once. The professionals behind cloud migrations must pay close attention to data privacy and security regulations.

**Know in advance how you will test your new cloud systems before migrating to them.** You need to have a strategy for stress-testing the software early on. A chemical company that is moving to the cloud will have one vendor's responsibilities in testing to end at so-called smoke testing—an initial testing to ensure that the most critical aspects of the system work well. However, more advanced levels of testing should be in place. For example, integration testing (to test how multiple applications work together) and performance testing (which typically include testing an application's connection to a network and its response time for users). It is one thing to have a cloud system operating on AWS or Microsoft's Azure platform. It is a much bigger challenge to have a part of an application on one cloud platform and another running an on-premises system. The networks that link those two systems can become huge performance issues.

## TAKING THE LIGHTER PATH

The number of companies moving down the path to the cloud has risen from a trickle to a torrent. Every company now needs to evaluate the opportunities of public clouds. Big reductions in IT capital expenses and the availability of enormous amounts of online computing power—all without significant capital costs. The meteoric rise of Netflix in the world of streaming video, and Capital One's moves in the fast-evolving landscape for online banks, show what happens to companies that read the tea leaves early. The public cloud becomes a key competitive tool. Even upstart taxi icon Uber was reportedly looking this spring to put some of its extensive technology infrastructure into a public cloud.[57]

To determine an effective path to the cloud, companies must have solid answers to the questions of what to move to the cloud, and how to do so without upending the business.

Their answer to the first question needs to factor not only what current systems should be ported over to the cloud, but also what new, previously impractical digital capabilities are now possible—as the computing infrastructure for it can now be rented, not purchased.

[57] Business Insider, Amazon, Google, and Microsoft might be going to war to win Uber's cloud business, May 9, 2016, accessed August 10, 2016, http://www.businessinsider.com/uber-outsourcing-infrastructure-to-public-cloud-2016-5

With a cloud strategy in hand, the next step is about anticipating the bottlenecks of taking inventory of a potentially massive application portfolio. The cloud strategy should also include re-architecting many cloud applications, minimizing disruptions to business functions, understanding the connections among applications, knowing how IT needs may vary by geography, and determining how to test new cloud systems before cutting over to them.

Companies that are well prepared for these challenges will make a smooth transition to the next great world of computing.

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