Microsoft

The Cloud, efficiency and innovation

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The cloud, efficiency, and innovation

Most people now agree that the cloud has become a core element of any enterprise's technology strategy. Indeed, in the past few years we have seen the conversation around cloud adoption move from "if" to "when" and "how."

Nevertheless, it remains one of the most disruptive changes in computing in years, and it is worth reviewing what makes the cloud so compelling to enterprise IT. Its value proposition is many-faceted, ranging from significant cost savings over a traditional datacenter approach, to the ability to quickly build robust, resilient applications that can scale-up as traffic spikes, and scale-down as it recedes.

Enterprise computing before the cloud

For nearly a half century, the economics of enterprise computing remained relatively constant. Enterprises purchased computing equipment and software from vendors and housed them in their own datacenters. Computers were like any other capital expense: a (usually large) one-time purchase followed by several years of depreciation.

As enterprises grew, so did the number of datacenters, for various reasons. Often as new facilities or plants were constructed, a new computing center would be built nearby. As they grew into other countries, a datacenter in that location would be required for both technical reasons (to reduce networking costs) and perhaps as well to comply with local regulations. And, finally, as computing became mission-critical for the operations of the business, new datacenters were built solely to support business continuity and disaster recovery requirements.

For the CIO, all of this expansion meant an IT organization that perhaps spanned the globe, but also one which required large numbers of skilled individuals to maintain all of the systems. It was not uncommon that a third of the IT staff was dedicated to "operations"—that is, maintaining the datacenters; procurement of new hardware; deployment of new servers, software, and retirement of depreciated hardware; network management; ensuring that system software patches were applied in a timely fashion; debugging router loops; and other such arcane issues.

Moreover, most CIOs intuitively understood that, then as now, demand on enterprise applications is, by and large, seasonal. Enterprise Resource Planning (ERP) systems that manage the corporate ledger are under the heaviest usage toward the end of the quarter and the end of the fiscal year. Performance management systems for employee reviews are most heavily used during the review period but are practically idle for the rest of the year. Many IT managers had "rules of thumb" to purchase three or four times the amount of hardware expected for the load—to ensure that applications never failed during peak usage.

Of course, the consequence was that average CPU utilization in the datacenter was, surprisingly, sometimes in single digits. Virtualization—putting multiple workloads on a single server—went some distance in improving utilization, but overall it remained low, which suggested that money was being wasted on IT assets that still were not being fully utilized.

Between operations staff, capital equipment management, and software maintenance, an IT department could easily spend 80 percent or more of its budget, with only a small amount left over for innovation. No wonder, then, that CEOs and CFOs constantly searched for ways to trim the IT budget, given that any money disbursed to IT was typically money lost to growing the business.

Something had to change.

Economics of the cloud

Shortly after the turn of the century, several technology vendors began offering computing services, in effect for rent—the birth of the cloud. It soon became evident that this model yielded important advantages for enterprise customers.

In cloud computing, enterprises pay for what they use, much as they would a telecom provider. If demand decreases and you no longer need capacity, you can turn off systems and you are not charged. This simple model stands in stark contrast to the *traditional, capital-intensive* model of enterprise computing just described.

The cloud, being subscription-based, is an *operating expense* model. In the cloud, computing becomes a service for which customers are billed a monthly charge. Like other such services, it is metered by usage. The more compute, network, and storage resources that you use, the higher the bill. Of course, the reverse is also true: the less you use, the less you are charged. Indeed, most IT organizations find wide variations in system utilization: some applications (e.g., retail shopping) are seasonal; other applications (e.g., training applications) run for a short period of time before being shut down; others are simply unpredictable. The cloud addresses this variability, as illustrated in Figure 1-1, perfectly by its "pay for what you use" model.

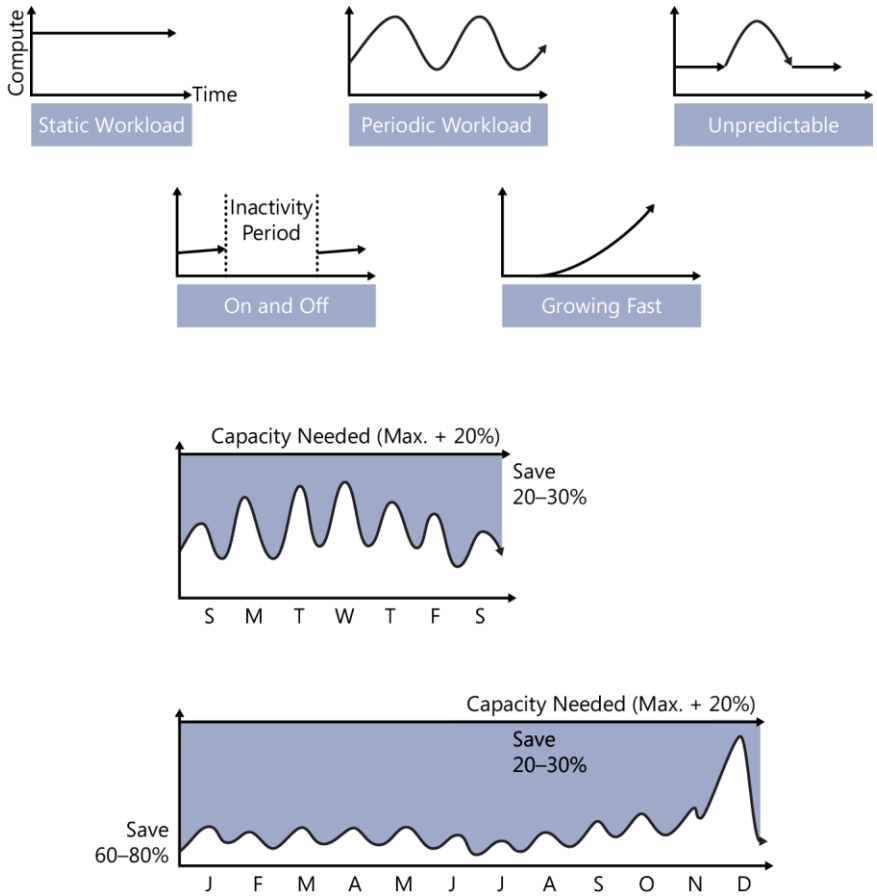

Figure 1-1: Common application utilization models

(It is worth mentioning that in the on-premises datacenter, as noted, the *maximum* utilization must be planned for and provisioned, which is financially far more inefficient than in the cloud.)

But there is more to it. Operating in the cloud frees enterprises of the mundane tasks of system backup, network maintenance, patches, and software upgrades, because the cloud provider can handle these chores in their entirety. The cloud provider in turn is heavily incented to utilize and, in many cases, pioneer best practices for system maintenance; the benefits are then passed on to the customer.

Moreover, cloud providers such as Microsoft can achieve economies of scale by buying hardware in massive bulk, tens of thousands of servers at a time, for example. Very large datacenters hosting public clouds can also achieve economies in purchasing other resources; cloud datacenters pay only a quarter of the average cost of electricity in the United States. In many cases, cloud datacenters take advantage of local renewable energy; for example, Microsoft's datacenter in Quincy, Washington, is located near a hydroelectric facility, and other datacenters use wind-generated electricity as well as other green sources.

Figure 1-2 shows how overall total cost of ownership (TCO) per server declines dramatically at scale.

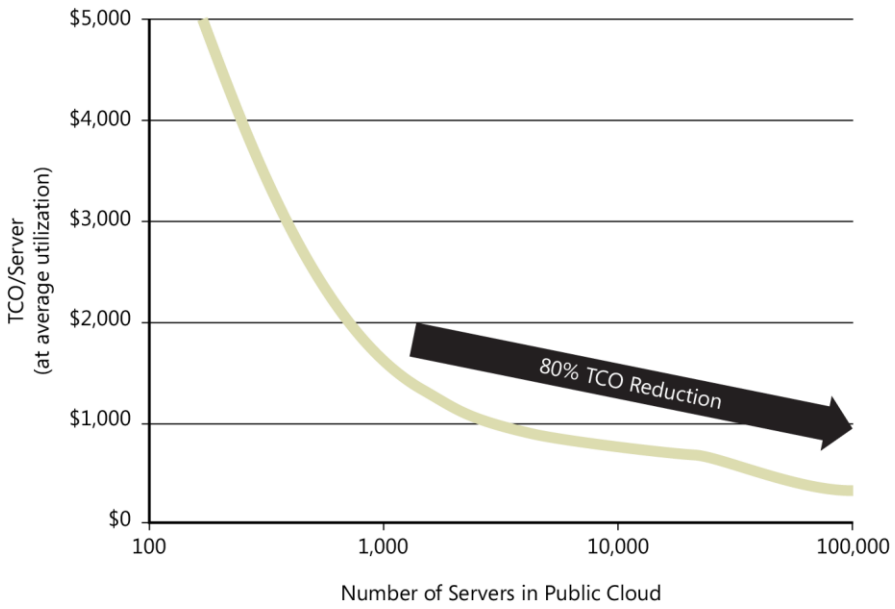

Figure 1-2: Economies of scale in the cloud

These savings can, and are, passed on to customers of the cloud service.

Later, we will discuss how IT departments can quantify the savings they can expect to achieve by adopting cloud computing.

Perhaps most important, the cloud is not an "either/or" proposition. It is certainly possible, and indeed in many cases desirable, to leave some applications running in a local, traditional datacenter while others are moved to the cloud. Providers such as Microsoft have made huge investments in this *hybrid cloud* model that securely connects applications in the cloud to those remaining in a customer's datacenter. As we shall see, the hybrid model makes it possible for companies to move their applications to the cloud *at their own pace*.

After there is an on-demand computing service available, all sorts of other efficiencies become possible. For example, systems devoted to development and application testing often constitute a large cost area for IT departments, yet, when all is said and done, they do not actually provide any direct value to end users. With the cloud, developers and testers can quickly allocate cloud-based resources, use them for their work, and then free them up when done. Similarly, with the vast, capacious amounts of cheap storage available in the cloud, data backup to the cloud—and across multiple geographies if desired—becomes a straightforward and inexpensive function. We cover more of these in the course of the book.

After TCO: the journey continues

Many companies we talk to have agreed that migration to the cloud will help them save money and operate more efficiently (and we agree with them). In fact, we talk later (in Chapter 7) about how, after companies move to the cloud, they can optimize their use of the cloud on a day-to-day basis, adjusting consumption and utilization to achieve their cost goals.

But that is only half the story. As many companies are discovering, the drive for lower costs is really only the first step in a journey.

The cloud opens up all sorts of possibilities for innovation, which makes not only IT better, but provides direct benefit to the business, making the CIO not just a cost center, but a real partner in driving value and growth for the business.

In 2016, Microsoft commissioned Forrester Consulting to conduct an independent study[1] on the return on investment (ROI) of using the cloud. In this case, the study focused on platform-as-a-service (PaaS) usage (more on this in the Chapter 2), but the results were striking: an ROI of 466 percent, with a reduction in the amount of IT time spent on maintenance at 80 percent, among other benefits:

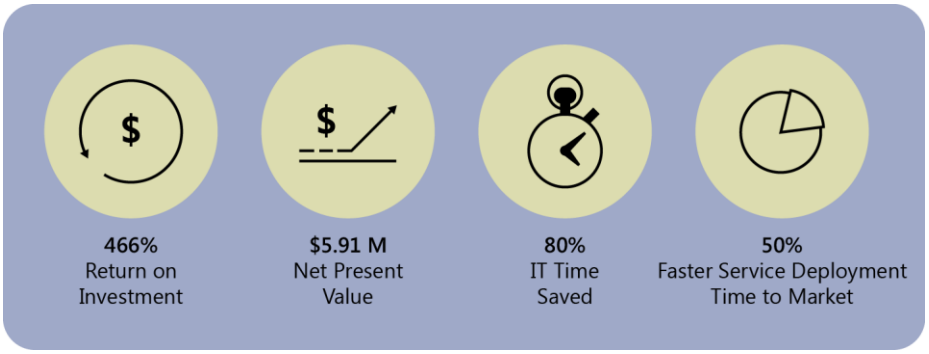

Figure 1-3: Cloud platform-as-a-service benefits

Of course, your mileage may vary, and we have considerably more to say about measuring cloud costs and cost savings in Part II of this book. However, what is salient at this point is that because of this substantial reduction in nonvalue-added tasks, such as maintaining servers and managing patches, enterprises were more able to focus their IT resources on *business innovation*.

Innovation

At the end of the day, the goal of any enterprise strategy is to create competitive differentiation and advantage, and little doubt remains that IT has become a key element in modern strategy. IT now drives transformative innovation, making it possible for enterprises to compete more effectively by instantiating processes that deliver ongoing competitive advantage.

As we will see, the emergence of a global computing cloud heralds the arrival of entire new classes of innovation across applications and markets. Indeed, such new forms of innovation can actually *transform* an organization, and a business.

Transformational innovation drives a different culture and mindset than most organizations currently have. Affecting both IT and the leadership of the enterprise as a whole, this culture requires a close alignment between IT and business leadership.

In the next few pages, we examine a number of brief case studies from various global companies, all of whom have reaped rewards by their use of the cloud.

Accuweather

AccuWeather, a leading provider of weather forecasts worldwide, needed a better solution for handling more than four billion daily data requests. Accuweather uses the cloud for development and for proofs of concept—a straightforward task given that, by using the cloud, it does not need to procure and provision hardware.

It also has gained on-demand scalability, improved access to real-time weather data, and cut IT costs by up to 40 percent.

Scale was particularly important: "As more connected devices came on the market worldwide, we went from two million to more than four billion requests a day within five years," says Chris Patti, vice

[1] "The Total Economic Impact of Microsoft Azure PaaS," July 2016

president of technology at AccuWeather. "Scale became a challenge." And within a few short years, that quadrupled to 17 billion requests every single day.

Weather, of course, is all about data. The company is using analytics and artificial intelligence capabilities in the cloud (Microsoft Cortana Intelligence Suite) to integrate sales data with weather information. In a recent project with Starbucks, AccuWeather helped the coffee giant solve seasonal problems like running out of ice and cups in hot weather. And, in another example, AccuWeather helped a global candy manufacturer identify which products sold best, and if the sales spikes were weather-related.

In short, by taking advantage of the cloud, Accuweather discovered what many enterprises have discovered, or soon will: the cloud can save you money and open up new markets.

GEICO

GEICO, a direct auto insurer since 1936 and now the second-largest private-passenger auto insurer in the United States, is enhancing its digital presence to better connect with customers through multiple digital venues. Referring to the rise of the mobile Internet and the explosion in social media participation, Fikri Larguet, director of cloud services at GEICO, notes:

> *In the last five to eight years, the customer appetite for digital engagement has grown enormously. Customers are engaging with us much more frequently and in new and interesting ways. We want to be ahead of the curve when it comes to where the next digital engagement opportunities will occur.*

But what does digital engagement mean? It means 24x7 availability, on every kind of device the customer might have, from anywhere.

Like Accuweather, Geico discovered that by moving to a cloud model, it could easily reach all of its customers, at any time and at any scale. Moreover, it found many of its IT costs declined: development teams accelerated as a result of their adoption of a DevOps (Chapter 7) model in conjunction with cloud development. Because of the cloud's ability to run multiple copies of applications in different datacenters, redundancy and business continuity/disaster recovery (BC/DR) operations are greatly simplified—again, these are benefits that any enterprise can reap.

Rolls-Royce

Rolls-Royce has more than 13,000 engines for commercial aircraft in service around the world, and for the past 20 years, it has offered customers comprehensive engine maintenance services that help keep aircraft available and efficient. As the rapidly increasing volume of data coming from many different types of aircraft equipment overtakes the airlines' ability to analyze and gain insight from it, Rolls-Royce is using the Microsoft Azure platform to fundamentally transform how it uses data to better serve its customers.

Rolls-Royce uses the scalable, on-demand nature of analytics (Chapter 12) in Azure, along with its artificial intelligence (AI) capabilities (Chapter 13), to perform data modeling and analytics at scale to accurately detect operational anomalies and help customers plan relevant responses. Says Nick Farrant, senior vice president of Rolls-Royce:

> *There are terabytes of data coming from large aircraft fleets, with gigabytes per hour—rather than kilobytes—to process and analyze. Microsoft Cortana Intelligence capabilities are helping us filter the signal from the noise across large datasets so we can focus on finding the real value in the data. Our vision of future digital capability will need to aggregate many sources of data and provide a platform for collaboration with customers.*

We believe, because of the remarkable technologies that exist today that make it possible for enterprises to capture huge amounts of data about what their customers, their partners, and their machines are doing that every enterprise will become a data-driven one. CIOs and IT decision makers should include data, analytics, and AI in their cloud plans because of the benefits that will accrue to their businesses.

Brainshark

Brainshark is a cloud-based sales training and readiness platform that helps sales people achieve mastery in the presentation of sales materials to clients, slashing the costs and resources needed for training and maximizing the effectiveness of sales engagements.

With half of the Fortune 100 as its clients, Brainshark is a clear worldwide leader in its space. And continuous innovation and improvement have kept it a leader for its 17 years in business, and poised the company for continued dominance.

Brainshark began its use of the cloud by placing all of its video training materials there. According to Brainshark's vice president of engineering, Michael Ferioli:

> *By moving video to Azure we've virtually eliminated the management and cost of maintenance we used to incur. We actually spend less with Microsoft than we thought we would on an ongoing basis. Actually, I have not bought a piece of hardware in more than two years.*

And what did the company do with its savings? It began innovating new ways of immersive sales training. For example, by using Microsoft's advanced augmented reality Hololens device, Brainshark created much more realistic training scenarios. Sales trainees can experience a simulated client engagement through Microsoft HoloLens, complete with presentation capabilities and life-like avatars representing clients. In contrast to virtual reality technologies, HoloLens combines real spaces with virtual elements, letting trainees practice in places with which they're familiar.

By taking costs out of nonvalue-added functions associated with an on-premises datacenter, Brainshark was able to truly innovate and differentiate in remarkable new ways.

Disaster Relief: Oso, Washington, 2014, and Nepal, 2015

Because the cloud gives IT the ability to create applications and make them operational very quickly, disaster recovery teams around the world rely on it to rapidly bring aid to people in need.

On March 22, 2014, a hillside saturated by heavy rains collapsed on the small Northwest town of Oso, Washington, flattening homes and killing 43 people. In the aftermath, nearly 200 government and aid agencies, including the Red Cross, the Federal Emergency Management Agency, the Washington National Guard and the US Navy's search and rescue team, as well as thousands of representatives of the media, descended upon Oso.

The local government's record-keeping and coordination systems were quickly overwhelmed, so Microsoft Services Disaster Response, with help from the Azure product team, migrated Oso's records to the cloud. With its nearly limitless capacity, the cloud made it possible for everyone who needed access to the records to retrieve—and search—them quickly and efficiently. Using Microsoft Office 365, the team also quickly deployed an Incident Command Collaboration System that provided a way for incident commanders and emergency liaisons from the various agencies to connect with one another.

A year later, a massive earthquake leveled some 600,000 buildings and killed thousands of people in Nepal, leaving the remote, mountainous country faced with the massive task of rebuilding. "Disaster relief is always overwhelming," Dan Strode, project manager for the United Nations Development Program (UNDP), said at the time. "There's too much to do, too many people that need help, and never enough time or resources."

The daunting task of rebuilding began with mapping where the original structures had stood. In the past, such records were maintained on paper. However, to expedite reconstruction, the Microsoft Innovation Center in Nepal built a mobile phone application (Figure 1-4) that used a device's GPS to help workers record the outline of a damaged home and store it in the cloud before clearing the debris. And to help restart the economy, the app also managed daily cash payments to the workers. Cloud applications like Office 365 and the Microsoft Power BI data visualization tool helped them to coordinate and track progress.

Figure 1-4: Nepal's debris management application

Learnings

What have we learned? These examples demonstrate the potential that the cloud offers. We explored how customers are able to do the following:

- Build and rapidly deploy applications with reach and scale that would have been impossible from their own datacenters
- Communicate with Internet-connected devices all over the world
- Tap into big data and analytics services for personalization, better products, and more efficient processes
- Enjoy unprecedented development, test experimentation, and innovation cycles

Every IT department is charged with safeguarding its company's information assets, with reducing costs, and with "keeping the lights on." These functions are, and always will be, critical components of any IT organization. Yet IT also must facilitate and foster innovation, both to make existing processes faster and cheaper as well as to support new and emerging business models.

With the cloud, the balance between maintenance and innovation shifts. As we shall see, operating in the cloud provides many cost advantages, which makes it possible for IT departments to focus more on innovation. Running in the cloud can reduce the need for rote operations such as system software upgrades and patching, thus permitting IT to redirect staff toward revenue-centric activities. And, new capabilities in the cloud make new kinds of powerful applications possible. As we have seen in the preceding examples, more and more companies now see the cloud as a way to accelerate business innovation and competitive differentiation.

But, as with any great technological change, this kind of transformation cycle involves much more than pure technology. It also requires a shift in corporate culture, enterprise and IT processes, individual roles, governance, and (for that matter) engineering. How an enterprise achieves this transformation is the subject of the remainder of this book.

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