CLOUDONOMICS

The Economics of Cloud Computing

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Executive Summary

There are many reasons for organizations to move from traditional IT infrastructure to Cloud Computing. One of the most cited benefits is the economics of the Cloud. Yet while many people point out the cost savings that Cloud Computing brings to an organization, we believe attention should be drawn to four distinct mechanisms through which these cost savings are generated;

- By lowering the opportunity cost of running technology
- By allowing for a shift from capital expenditure to operating expenditure
- By lowering the total cost of ownership (TCO) of technology
- By giving organizations the ability to add business value by renewed focus on core activities

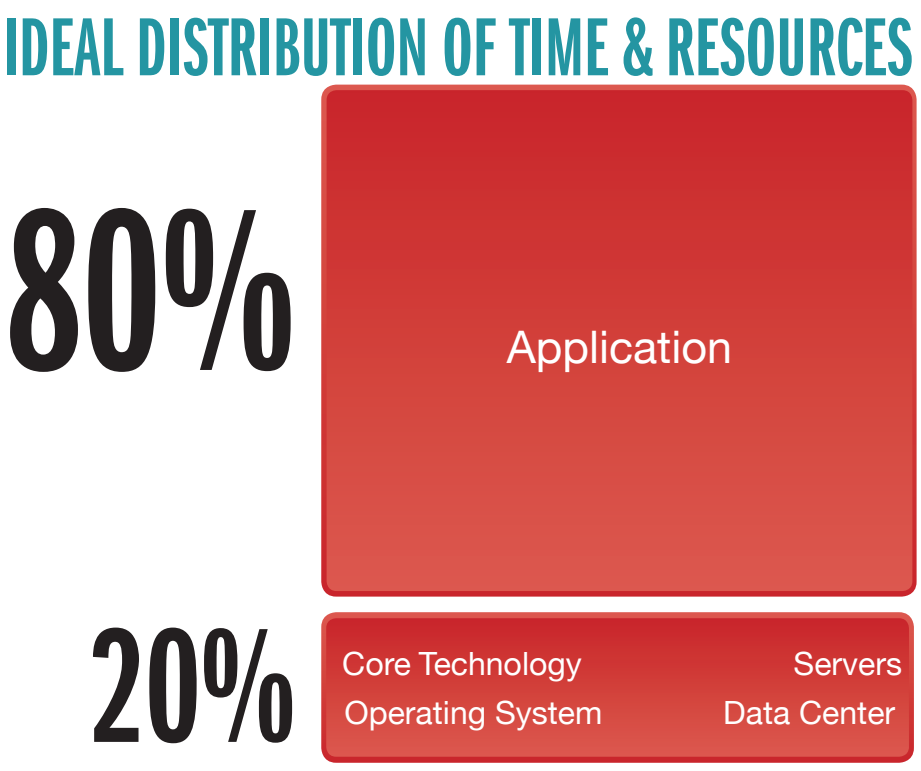
In this paper we detail these four mechanisms and introduce several case studies and examples to show the increased economic value that Cloud Computing brings to an organization.

The Problem with the 80-20 Rule

The 80-20 rule is often used within organizations to illustrate the large effects that small variables can have. It was first suggested by business management thinker Joseph Juran and originally called the Pareto principle[1] after Italian economist Vilfredo Pareto. Rather than an absolute measure, it tends to be a generalization that is intended to make a point about distribution curves. The most well known use of the rule is the sales 80-20 rule which says that 80% of revenue for a business is derived from 20% of customers.

Information Technology has its own series of 80-20 rules. As we detailed in a previous CloudU report[2] Gartner estimates that IT maintenance accounts for around 80% of total IT expenditure.[3]

However we contend that the 80-20 rule occurs elsewhere within IT and relates to time, just as must as it relates to monetary costs. When we look at organizations running their own data center infrastructure, and extend Gartner's findings, we hypothesize that only 20% of the time and effort that goes into running applications, where all business value is concentrated, is actually concerned with running those applications themselves. The diagram below illustrates the extent that routine and non-core tasks, like patching operating systems and performing backups, impact upon the time of IT departments.



Cloud Computing is a force that helps flip this ratio and gives IT departments the ability to spend 80% of their time on core business processes, like business application design. It's for this reason, the ability to go from 20% of time and money dedicated to core business processes to 80%, that the economics of Cloud Computing is so compelling. Nowhere is the current model's inefficiency more evident than in the opportunity costs that organizations pay to manage their own computing needs.

Remember the Opportunity Cost

Opportunity cost, a concept first developed by British philosopher John Stuart Mill, is a basic economic premise that is concerned with the costs related to the choices NOT made by someone. Opportunity cost is;

> "the cost related to the next-best choice available to someone who has picked among several mutually exclusive choices. It is a key concept in economics. opportunity costs are not restricted to monetary or financial costs: the real cost of output forgone, lost time, pleasure or any other benefit that provides utility should also be considered opportunity costs[4]"

Opportunity cost is an important concept when discussing the economics of Cloud Computing because it allows one to assess the true cost of any potential action. When choosing a particular direction for IT spend, for example, there may be no direct cost attached to maintaining the status quo - data centers have already been built, software purchased. However by including opportunity costs in any calculation, an organization allows for a truer comparison between the various choices to be made.

With this explanation of opportunity cost, we can now apply the concept to a decision to either retain on-premise IT or move to the Cloud. As we've already seen, roughly 80% of IT time and expenditure is wasted on processes that don't create any value for the organization (beyond maintaining the status quo). The opportunity cost of not choosing the Cloud is therefore the benefit that can accrue to the organization through optimal utilization of that 80%. To put it simplistically, a move to the Cloud can make the difference between an organization being 20% efficient, and one being 80% efficient.

While opportunity cost, and the value to be gained by reducing that cost, is a compelling benefit of moving to Cloud Computing, many critical readers will want to see more concrete examples of the economics at work. To this end it is important to understand the gains to be made from a move away from capital expenditure, and over to operating expenditure.

OpEx is the New CapEx

Traditional IT expenditure has been very capital intensive. Hardware had to be bought outright and software licenses were generally an expenditure that appeared on the balance sheet. For this reason the decision making process for technology spend became very drawn out.

One of the core tenets of Cloud Computing is that it is a recurring expenditure model and - as we detailed in a previous report[5] is much like telephone or electricity expenditure in that it is accounted for as a standard operating expense.

There are several distinct reasons that OpEx, or operating expenditure, is preferred to CapEx, or capital expenditure.

Financial Considerations

OpEx is beneficial for the organization, as it gives it the flexibility to terminate costs at will. With a capital purchase, the server or software being acquired is fully committed to. Regardless of whether it is being utilized, the ongoing costs (by way of depreciation or financing costs) still need to be borne. Contrast this with OpEx where, in the event that the item is no longer required, payments can cease rapidly. It is for this reason that many companies prefer leasing vehicles in place of purchasing them outright.

	Internal IT	Managed Services	The Cloud
Capital Investment	$40,000	$0	$0
Setup Costs	$1,000	$5,000	$1,000
Monthly Services	$0	$4,000	$2,400
Monthly Labor	$3,200	$0	$1,000
Cost over three years	$149,000	$129,000	$106,000
Savings Gained	0%	13%	29%

Estimated costs of infrastructure for two application servers, two database servers and a load balancer across internal, managed and Cloud deployment models. Source O'Reilly Media: George Reese[7]

While it is true that organizations pay a premium per unit for the flexibility to be able to suspend service, as we will see elsewhere in the report, the total cost of ownership (TCO) of owned assets is much higher as demonstrated in the previous chart.[6]

Allows Business Units to Decide

Most organizations have relatively strict rules in place for all but the most simple of capital expenditure spending. Operating expenditure however tends to be more frequently delegated to individual business units. In this way, and in keeping with the democratization that is attendant with Cloud Computing,[8] individual business units have the ability to acquire technology that answers their particular business needs. This flexibility at the business unit, and even individual level, is in fact one of the major forces that is contributing to the growth of Cloud Computing. While sometimes lauded, and sometimes lamented in the press,[9] 'rouge' departments in larger organizations are often the first to experiment with Cloud Computing and the first to experience the economic benefits that go along with it.

Overcomes Expenditure Limitations

Acquiring capital for large purchases is difficult, for all sizes of organization. This is especially true for smaller organizations for which finance companies apply rigorous debt to equity ratios and thus the amount of capital they can acquire. For this reason it has historically been difficult for organizations to sufficiently justify capital expenditure to get approval for many projects. Moving to an OpEx model removes this limitation and allows small scale projects to be undertaken, unconstrained by capital considerations.

While a move away from CapEx is undoubtedly attractive to organizations, it is via TCO that the economic benefits of Cloud Computing become most clear.

Total Cost of Ownership

As mentioned previously in this report, when comparing costs between on-premise options and Cloud Computing, it is important to accurately assess the true costs of both options. It's important to remember that, with the Cloud, most costs are up front and readily calculated this is due to a number of factors;

- Cloud providers give transparent pricing based on different usage metrics - RAM, storage, bandwidth, among others
- Pricing is frequently fixed per unit of time. Customers gain certainty over pricing and are then able to readily calculate costs based on several different usage estimates

Case Study: Gregory/Ricochet fashions a TCO win using Software-as-a-Service

Vend[13] is an online point-of-sale (POS) application, with the backend run entirely by cloud hosting provider, Rackspace Hosting. Vend built their retail POS application, VendHQ, from the ground up to leverage the benefits of Cloud Computing and provide the cost saving benefits and no stress infrastructure management to retail business owners. Gregory/Ricochet[14] is a fashion retailer with 12 stores spread across New Zealand. They previously hosted their own server infrastructure internally to provide the retail platform, and POS for all their stores which required a private network, creating problems keeping all 12 stores in sync.

Before considering Cloud Computing, Gregory/Ricochet's IT budget was $30K per annum (not including hardware) which covered;

- Server maintenance of their internally hosted retail platform
- IT support for each of the stores POS and upgrades
- IT support of the Head Office infrastructure and network
- Remote backup services

Gregory/Ricochet moved to the Vend Cloud retail platform to run their in-store front counters, back office, and manufacturing and distribution centre. They also moved to other Cloud Applications including Google apps[15] for mail, calendaring and contacts, DropBox[16] for sharing file and documents, and Xero[17] for accounting.

Using VendHQ, they can manage their users, product catalogue, and get real-time statistics on their retail stores from any computer, while no longer having to manage an internal network.

From an economic perspective, the savings are impressive. Total software subscriptions are now around US$350 per month, and they maintain no internal servers or network other than a simple WiFi network. Their IT support requirements are now much simpler as well, significantly reducing IT support costs. Finally, Gregory/Ricochet had to buy no new hardware to move to the new platform, and migrated the entire operation in only a couple of weeks with minimal consulting expense.

Compare this to on-premise technology. In a recent article for CIO.com,[10] Bernard Golden discussed why direct cost-comparisons between the Cloud and on-premise are difficult. As he points out, calculations of in-house costs fail to take into account;

- The direct costs that accompany running a server: power, floor space, storage, and IT operations to manage those resources
- The indirect costs of running a server: network and storage infrastructure and IT operations to manage the general infrastructure.
- The overhead costs of owning a server: procurement and accounting personnel, not to mention a critical resource in short supply: IT management and its attention.

All of these hidden costs make a direct cost comparison difficult. However to help in calculating true TCO, Jonathan Koomey from Stanford University wrote a paper several years ago entitled 'A Simple Model for Determining the True Total Cost of Ownership for Data Centers'[11] As part of the paper, Koomey developed a spreadsheet to aid in the calculation of True TCO for data centers[12] which can be used in costs comparisons.

Despite these cost savings however, we believe Cloud Computing offers significant extra value to organizations by merit of the fact that it allows them to focus on their core business. It is our contention that this value side of the equation is even more compelling than any cost savings possible.

Time is Money: Focus on What Matters

A recurring theme among Cloud proponents is the fact that Cloud Computing enables organizations to focus on their core business. In the same way that we consider it bizarre that, given widespread availability of electricity on tap, an organization might create their own electricity plant to power their factory, so too is it becoming more bizarre to host one's own software or buy one's own hardware. Recently Netflix, the nearly $10 billion online video rental and streaming service, posted[18] an article detailing their decisions to move to Cloud Computing infrastructure. It is worth reviewing their rationale, in particular a deciding factor that directly relates to focusing on core activities. As Netflix say;

> "The problems [the Cloud hosting company] are trying to solve are incredibly difficult ones, but they aren't specific to our business. Every successful internet company has to figure out great storage solutions, hardware failover, networking infrastructure, etc.
>
> We want our engineers to focus as much of their time as possible on product innovation for the Netflix customer experience; that is what differentiates us from our competitors.
>
> We chose to be pioneers in this transition [to the Cloud] so we could leverage our investment as we grow, rather than to double down on a model we expect will decline in the industry."

While it can be difficult to assign a direct economic benefit to the ability to focus on core business processes and abstract responsibility for non-core activities to a third party, we consider it analogous to specialization of labor. In the 18th Century, Economist Adam Smith described in The Wealth of Nations [19] , the production of a pin in the following way[20]

> "One man draws out the wire, another straights it, a third cuts it, a fourth points it, a fifth grinds it at the top for receiving the head: to make the head requires two or three distinct operations: to put it on is a particular business, to whiten the pins is another ... and the important business of making a pin is, in this manner, divided into about eighteen distinct operations"

Smith goes on to estimate somewhere between a 240 and 4800 fold increase in productivity by a specialization of labor of this sort. It is our view that Cloud Computing will drive benefits for organizational focus akin to those that Smith witnessed in the pin factory.

Conclusion

We believe that there are significant economic benefits to be gained from a move to Cloud Computing. These benefits accrue to a business in two distinct ways directly through reduced costs and indirectly by allowing for increased focus on core business functions.

We stress however, and have covered in a previous report [21], that there are multiple forces at work leading to the growth of Cloud Computing. The economics are but one of these forces and, as such, we urge organizations considering the Cloud to look at broader benefits and impacts beyond pure economics. Many of these benefits will be covered in future CloudU reports.

Appendix 1

The Ten Laws of Cloudonomics

In 2008, Joe Weinman, then Strategic Solutions Sales VP for AT&T Global Business Services, created the 10 Laws of Cloudonomics[22] that still, after two and a half years, are the foundation for the economics of Cloud Computing. We've reproduced an abridged version of the Cloudonomics laws below.

Cloudonomics Law #1: Utility services cost less even though they cost more. Although utilities cost more when they are used, they cost nothing when they are not. Consequently, customers save money by replacing fixed infrastructure with Clouds when workloads are spiky, specifically when the peak-to-average ratio is greater than the utility premium.

Cloudonomics Law #2: On-demand trumps forecasting. Forecasting is often wrong, the ability to up and down scale to meet unpredictable demand spikes allows for revenue and cost optimalities.

Cloudonomics Law #3: The peak of the sum is never greater than the sum of the peaks. Enterprises deploy capacity to handle their peak demands. Under this strategy, the total capacity deployed is the sum of these individual peaks. However, since clouds can reallocate resources across many enterprises with different peak periods, a cloud needs to deploy less capacity.

Cloudonomics Law #4: Aggregate demand is smoother than individual. Aggregating demand from multiple customers tends to smooth out variation. Therefore, Clouds get higher utilization, enabling better economics.

Cloudonomics Law #5: Average unit costs are reduced by distributing fixed costs over more units of output. Larger Cwloud providers can therefore achieve some economies of scale.

Cloudonomics Law #6: Superiority in numbers is the most important factor in the result of a combat (Clausewitz). Service providers have the scale to fight rogue attacks.

Cloudonomics Law #7: Space-time is a continuum. Organizations derive competitive advantage from responding to changing business conditions faster than the competition. With Cloud scalability, for the same cost, a business can accelerate its information processing and decision-making.

Cloudonomics Law #8: Dispersion is the inverse square of latency. Reduced latency is increasingly essential to modern applications. A Cloud Computing provider is able to provide more nodes, and hence reduced latency, than an enterprise would want to deploy.

Cloudonomics Law #9: Don't put all your eggs in one basket. The reliability of a system increases with the addition of redundant, geographically dispersed components such as data centers. Cloud Computing vendors have the scale and diversity to do so.

Cloudonomics Law #10: An object at rest tends to stay at rest. A data center is a very large object. Private data centers tend to remain in locations for reasons such as where the company was founded, or where they got a good deal on property. A Cloud service provider can locate greenfield sites optimally.

Weinman has since expanded the Laws to cover irrational cognitive biases[23] and provided a number of detailed proofs of the Laws.[24]

About Diversity Analysis

Diversity Analysis is a broad spectrum consultancy specializing in SaaS, Cloud Computing and business strategy. Our research focuses on the trends in these areas with greater emphasis on technology, business strategies, mergers and acquisitions. The extensive experience of our analysts in the field and our closer interactions with both vendors and users of these technologies puts us in a unique position to understand their perspectives perfectly and, also, to offer our analysis to match their needs. Our analysts take a deep dive into the latest technological developments in the above mentioned areas. This, in turn, helps our clients stay ahead of the competition by taking advantage of these newer technologies and, also, by understanding any pitfalls they have to avoid.

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- Research Alerts
- Research Briefings
- Whitepapers
- Case Studies

We also participate in various conferences and are available for vendor briefings through Telephone and/or Voice Over IP.

About Rackspace

Rackspace® Hosting is the service leader in Cloud Computing, and a founder of OpenStack™, an open source Cloud platform. The San Antonio-based company provides Fanatical Support® to its customers, across a portfolio of IT services, including Managed Hosting and Cloud Computing. Rackspace has been recognized by Bloomberg BusinessWeek as a Top 100 Performing Technology Company and was featured on Fortune's list of 100 Best Companies to Work For. The company was also positioned in the Leaders Quadrant by Gartner Inc. in the "2010 Magic Quadrant for Cloud Infrastructure as a Service and Web Hosting." For more information, visit www.rackspace.com.

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Ben Kepes is an analyst, an entrepreneur, a commentator and a business adviser. His business interests include a diverse range of industries from manufacturing to property to technology. As a technology commentator he has a broad presence both in the traditional media and extensively online. Ben covers the convergence of technology, mobile, ubiquity and agility, all enabled by the Cloud. His areas of interest extend to enterprise software, software integration, financial/accounting software, platforms and infrastructure as well as articulating technology simply for everyday users. More information on Ben and Diversity Limited can be found at http://diversity.net.nz

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Endnotes

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