UNDERSTANDING THE **TRUE COSTS** OF CLOUD COMPUTING

Cloud computing is promoted as a way to reduce IT costs at the same time as enabling operations agility, efficiency and innovation. But while may companies report real benefits, others have been disappointed by their results. Some companies have saved money. Others have been hit with what they feel are astronomical and often surprising costs even including, as we'll discuss in this paper, examples of so called "free" resources that have cost thousands of dollars.

The reality is that cloud pricing is actually very confusing. Whether or not you reduce or increase costs depends on a variety factors, some of which many companies don't really understand until it's too late.

The current situation is reminiscent of cell phone plans. Comparing costs between your current situation and a cloud-based equivalent is difficult. Comparing between providers is also very difficult. Although each cloud provider has some guidance and even calculation tools, it's almost impossible for the average company to truly anticipate costs or do an "apples-to-apples" comparison.

In response, some tools have sprung up on the web. The RightScale Cloud Comparison **Tool** and Pricing Comparison **article** illustrate some of the price challenges and issues. The situation gets even worse when you have

hybrid and multi-cloud solutions that include multiple providers, with each having different pricing structures.

A FREE SERVER THAT COSTS THOUSANDS?

One of our consultants did an experiment which required establishing three identical servers for his tests. When he saw there were "free server" options with one public cloud provider, it was a "no-brainer" to use the public cloud resource rather than find and provision physical or even virtual servers in the current in-house data centre. Imagine her surprise when a bill arrived for over $1,400 for these "free" servers. Yes, the servers were free — but data in transit led to the unexpected costs. The lesson learned is that the devil is in the details — you must understand all the cost elements to ensure there are no surprises.

AWS, for example, has four ways to pay for an EC2 server:
- on-demand instances,
- reserved instances,
- spot instances, and
- dedicated hosts.

EC2 prices are based on the processor, storage and networking specifications, with on-demand compute capacity charged on a per hour or per second basis (depending on which instances you run).

There are real benefits to this consumption based approach. In the AWS model, there are no long-term commitments or upfront payments. Capacity can be increased or decreased, and you only pay for what you use. If your workload justifies it, reserved and spot instances can yield up to 90% savings. In other cases, you can still have the so-called "free" resources that cost you much more than you ever thought possible.

Cloud storage pricing is probably the easiest to calculate, but it still requires some decisions such as access patterns (frequent, infrequent or archival). Actual storage pricing is straightforward – choose the tier and the amount you need. Generally, it is free to upload data into storage, but there are charges for transferring or downloading the data. While "Cold storage" (e.g., Amazon Glacier) can be very inexpensive, retrieving data, when compared to other active storage options such as AWS S3, is as the name suggests, "glacial".

To simplify this, the major cloud providers all offer online tools for estimating the charges. To be clear, none of these calculators are actual price quotes. And differences in service among the providers can make meaningful comparisons difficult. The Amazon **calculator**, for example, produces monthly costs for a wide range of AWS services (they have more than 140 services). Needless to say, the calculator requires you to know what services you want and how they will be used. That requires a fairly in-depth understanding of your new AWS architecture. For example, in an AWS EC2 server calculation, you choose an AWS region and specify the number of instances, the instance sizing, the billing method and the data transfer loads.

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Inbound data transfer is free while outbound data transfer is limited to 1Gb free per region per month (which could lead to the surprise charges in the experiment above!). But it's not just AWS that is confusing. Similar calculators, with similar input requirements, are available for Microsoft **Azure**, Google **GCP** and even **IBM**.

MORE COSTS, MORE COMPLEXITY?

Even if you can figure out the essential data to get a clear cost estimate, you have to remember that the basic solution service costs are not the total cost of operation. Various other factors need to be considered including:
- internal company resources for operations,
- administration, and
- security and management.

These factors and issues are even more complex when multiple cloud providers are involved.

KNOWING WHAT YOU NEED TO KNOW

While it's easy to spin up new server with any consumption model, you have to actively manage your use of cloud resources - if you have times when you don't need a server, then you can reduce costs by shutting the server down until it is needed again. But there have to be triggers that cause you to do this. While some ongoing costs may be relatively small, companies risk the "death of a thousand paper cuts" with unused services that are routinely paid on the company credit card. So while you don't need operations staff to keep the servers running, you still need someone

to monitor and manage your cloud assets. Some companies use external partners to manage their cloud assets (e.g., Security-as-a-Service or Management-as-a-Service).

Tracking operational costs (via billing information, for example) is also important. There are many possible reasons for unexpected costs, especially with usage-based services. Sources of unplanned charges would include incorrect service use, sudden increases in traffic, sub-optimal capacity allocation and even software bugs or security events. Monitoring the charges on a day-to-day basis can help to identify technical problems to be corrected.

One friend, a CIO who worked with a large government agency, tells a story of buying into cloud processing thinking that they had a small and manageable cost only to be confronted with a bill for over a hundred thousand dollars on the agency credit card. This "cost saving" measure led to some very uncomfortable discussions with senior management.

MORE THAN JUST COST

While cloud providers would like you to just get started and "get your hands dirty" by starting up a cloud server with a credit card, that may not be a good strategy – not only will there be cost surprises, it turns out that, without really understanding what you are doing, the public cloud offers an infrastructure that can also be sub-optimized, expensive and even risky. Without fully understanding how to optimize your setup in the cloud, you can actually end up with the trifecta of bad cloud karma – high costs, low performance, and bad security.

Clearly defining the technical solution and knowing the capacity and performance requirements is critical. Understanding how to implement solutions in the various cloud providers is also essential.

In fairness, the cloud providers are trying to make it easier – especially in terms of understanding costs. A new offering from Amazon, the AWS Cost Explorer console, aims to provide "brand new summary dashboards, automated identification of spend and usage trends, and a simplified user experience." Tools such as this can help users of all sizes and levels of expertise to perform cost management activities, but there is also a need for tool integration across providers.

ACTIVE CLOUD MANAGEMENT IS ESSENTIAL

According to **Forrester**, cloud complexity makes dedicated cost management a necessity. Cost discount optimization is a continuous process that requires both technical and financial expertise. Any

transition to cloud computing must include new internal roles and processes for cloud cost monitoring and tools for forecasting the cost impact of operational changes. And although the emphasis of this article is costs, you also need to remember that "shared responsibility" models mean that you need to pay attention to the technical structure and security processes that the cloud provides.

RESISTANCE IS FUTILE

Do our warnings mean that you should avoid the cloud? The simple answer is – no. Cloud already is or soon will be a valuable and inevitable part of every company's Information Technology resources. In the end, cloud computing will replace most in-house resources in the same way that software-as-a-service has eliminated so many home-grown software solutions. But until that magic day when all computing is a simple and ubiquitous resource, you need to either invest in understanding cloud or find a partner who can steer you past the issues and pitfalls and lead you to the true benefits.

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As more and more business processes are driven by cloud-based applications, cloud cost management will increase in importance and value. But the pricing and services will also evolve and change over the life of a cloud solution.

Those who are moving to the cloud purely for cost savings are at particular risk not just from costs, but in recovering from mistakes. The cost of terminating a service and removing an application and/or its data are often forgotten. These should be built into the costing and the service agreement. Data export or even data retention requirements, etc. can become significant costs.

THE BOTTOM LINE

IT World Canada's CIO Census has, for the last two years, identified cloud computing as one of the IT tools that has either "met or exceeded expectations." These kudos come from a very experienced and jaded audience. That same group rated "classic outsourcing" as distinctly "underperforming" in terms of their expectations.

In summary - there are issues. Despite the challenges and the learning curve, cloud computing is without question the next wave in IT. Taking the time to learn the details, to work out your architecture, to document your migration strategies and to establish standard operating methods are critical. IT departments have to either develop and maintain these resources or find the best partners to plan, support and manage their clouds. Only with active knowledge and management can you achieve the agility and benefits while also reducing your overall costs. And although it's not as simple as it looks, when properly managed, cloud computing has been proven to yield real benefits for those who do it well.

STILL HAVE QUESTIONS? WE CAN HELP.

Cloud offers some real benefits and it's an important consideration for any company, regardless of size or industry. But like anything new, there's a learning curve and sometimes there are pitfalls along the way. We designed this paper to get you thinking about the benefits and the issues. We hope we've given you some answers, but no doubt we've also raised some additional questions.

We'd be more than happy to continue the discussion and help you benefit from our experience and expertise.

Contact us at **hello@padv.ca** or give us a call at **1-888-543-7810**