

AVOID BUDGET OVERRUNS: A GUIDE TO ASSESSING CLOUD IT ECONOMICS

Stratecast

F R O S T  S U L L I V A N

An Executive Brief Sponsored by IBM

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May 2016

INTRODUCTION

Most IT leaders are seasoned and savvy technology buyers. They assess potential expenditures in the context of overall business value, examining their options not just for topline costs but total cost of ownership. So, why does the disciplined approach disappear when it comes to cloud services?

As enterprises implement their digital transformation strategies, they require a flexible, hybrid IT environment that can support business goals for market agility, growth, and cost-containment. For each workload, IT leaders must determine the optimal infrastructure environment (on-premises or cloud). At the same time, they need to consider that the “optimal” environment will change as business needs, technology, and commercial options evolve. As a result, the workload assessment process should determine not just which cloud service or data center option offers the greatest price-performance today, but also consider the direct and indirect costs associated with migrating the workload if a different option is preferable tomorrow.

Unfortunately, according to Stratecast research, most IT decision-makers have surprisingly little understanding of cloud economics: neither what they are spending on cloud services nor what they should be spending. Many begin their cloud assessment process with the unfounded assumption that the cloud—any cloud—will always represent savings over premises-based options; when, in fact, the optimal environment for some enterprise workloads may be the private data center.

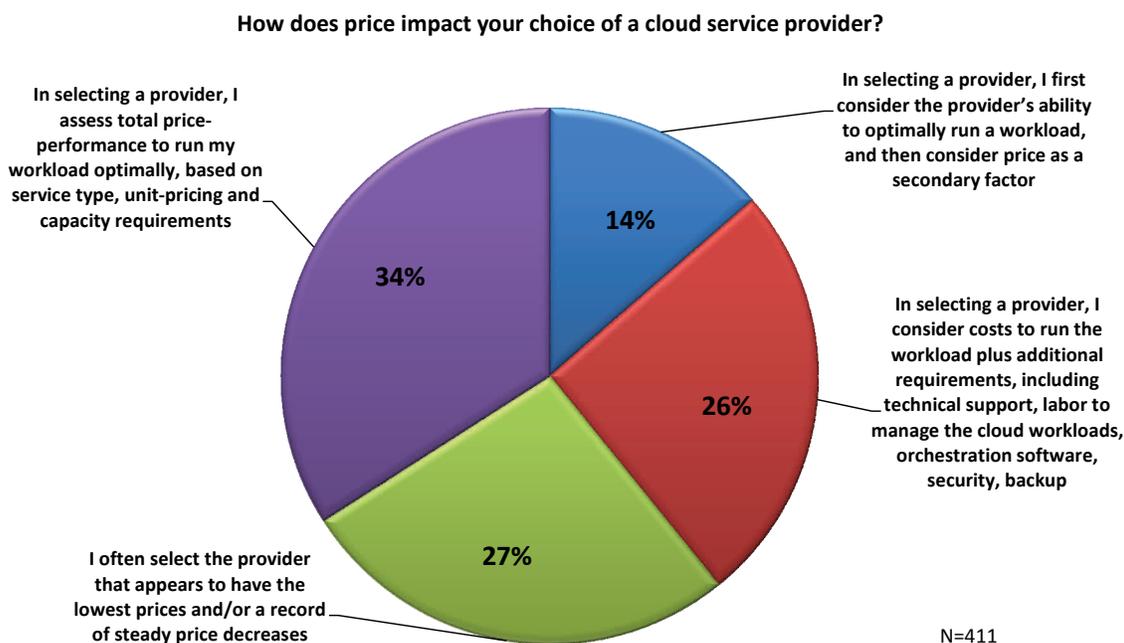


Only 25% of IT decision-makers do a complete cost analysis to understand what it will take to manage a workload in various providers' clouds.



Furthermore, in choosing among cloud service providers, they often take shortcuts when it comes to understanding what they will (and will not) be paying for. As shown in Figure 1, on the next page, only 25% of IT decision-makers do a complete cost analysis to understand what it will take to manage a workload in various providers' clouds. That's less than the percentage who admit their selection is swayed by the “appearance” of low prices.

Figure 1: In Selecting a Cloud Provider, Few Decision-Makers Assess the Total Cost

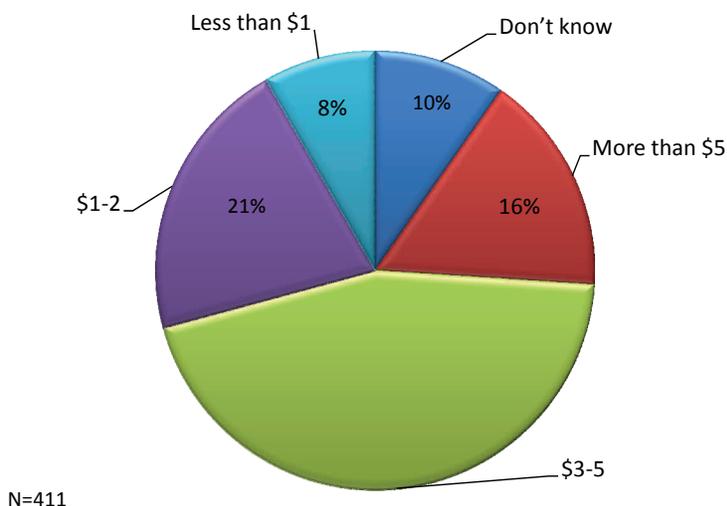


Source: *Stratecast Cloud Survey of 411 US-based IT Decision-Makers, 2015*

Of course, more than business process is at stake. As enterprises place more workloads into the cloud, many are finding that actual costs for running a cloud workload significantly exceed the budget. **For every dollar in IaaS expenditures, businesses may spend \$3 or more to manage the service, according to the Stratecast survey.**

Figure 2: Total Cost of Managing a Cloud Workload Can be 3-5x the Base IaaS Fees

Costs to manage cloud services can include internal labor, licenses for management software, and fees paid to third-party service providers. For every dollar your organization spends on IaaS, how much do you estimate you spend managing the service?



Source: *Stratecast Cloud Survey of 411 US-based IT Decision-Makers, 2015*

If they miscalculate costs upfront, IT leaders not only have to find a way to manage the budget gap—they may also find their credibility damaged among the executive team. Thirty-two percent of respondents in the Stratecast survey said their biggest challenge in building out their cloud strategy is obtaining additional budget; another 22% were concerned about ongoing support from business leaders. Fifty-five percent expressed concern that the return on investment would not be sufficient to justify moving additional workloads to the cloud.



32% of IT decision-makers say their biggest challenge in building out their cloud strategy is obtaining additional budget. Another 22% are concerned about ongoing support from business leaders.



And it's not simply book-rates that differ among cloud service providers. Because each provider configures its infrastructure services differently, enterprises may be unpleasantly surprised to encounter significant differences in workload performance among seemingly “like” services. Such differences may require the enterprise to procure additional resources, or experience decreased productivity. Furthermore, depending on the provider's platform, you may have to convert your virtual machines to move them to a cloud—or to bring them back in-house—so your migration plan may be less seamless and more disruptive than you had expected.

Don't let your business suffer from misunderstandings about the true cost of various cloud services. As you implement your cloud strategy, you need to shape your choices with full understanding of the impact on budget, resources, and productivity. In this brief, we walk through the cost- and performance-impacting elements you need to consider in your decision, including some that may surprise you.

THE PITFALLS OF CLOUD PRICING: WHY “PER-INSTANCE” RATES ARE A POOR PROXY FOR TOTAL COST

Cloud infrastructure is sold primarily in units (or “instances”) comprising some combination of processor, memory, and storage resources in various sizes. And many providers focus attention on low and dropping “per-instance” rates. However, using unit-pricing as a basis for comparing cloud services will produce misleading results. Here are a few facts to keep in mind about the real costs of cloud services:

Cloud “Units” are Not Alike

Similarly-sized units from different providers may appear to be alike, but they may differ in ways that impact both total cost and value. For example:

- **Most cloud services offer units in pre-determined bundles of processor, memory, and storage.** That means, in almost every case, you'll be overpaying for capacity in at least one component. For true “pay per use” pricing, you're better off with a provider like IBM SoftLayer that allows you to select and pay for exactly the capacity you need.

- Don't assume the memory in the bundle is persistent. **Some leading providers, including AWS, include just ephemeral memory in their lowest-priced units;** if your workload requires persistent memory, it's available at an additional charge.
- If you have a performance-sensitive workload, be aware that **the processor in the server supporting your cloud unit may be an older-generation model.** Cloud service providers generally will tell you the actual processor (e.g., Ivy Bridge, Haswell) when you deploy a workload; however, if you don't think to investigate, you may find that your workloads perform more poorly with one provider than another, thus requiring you to add instances (at a cost) to gain the performance you need.

Bare Metal Servers May Prove Optimal for your Workloads

As you determine the optimal cloud environment for your workloads, you probably consider security and compliance requirements as you consider the “single vs. multi-tenant” (or private vs. public cloud) decision. But are you aware that you have another cloud choice—bare metal servers? And that your choice can impact workload performance as well as costs?

Bare metal, or physical servers, are offered by a limited number of cloud service providers. Bare metal is similar to single-tenant cloud options, in that your workload does not share a processor with other cloud customers. But with bare metal, your workload has access to the entire server. There is no provider-installed hypervisor, which means you can use bare metal for non-virtualized workloads, or you can install your own hypervisor.

Bare metal servers offer several benefits over single- or multi-tenant cloud options:

- **Performance advantage** – The fact is, a hypervisor extracts a “tax” from the processor, which means that the “virtual CPU” (VCPU) that defines an instance actually delivers less processing power than an equivalent physical CPU. With bare metal, your workload can utilize all the available processor capacity.
- **Greater control** – With bare metal, you (not the cloud service provider) are in charge. You can deploy non-virtualized workloads. Or you can install and control a hypervisor of your choice.
- **Cost advantages** – It may come as a surprise to some enterprises, but the greater performance and control afforded by bare metal can add up to overall savings over multi- or single-tenant options, despite an apparently higher per-unit cost. For any high-performance compute workloads, as well as many steady workloads, it's worth including bare metal in your cost comparisons.

Add-on Costs Can Cause Budget Overruns

Like those insidious but unavoidable fees tacked on to a car rental or hotel stay, some cloud services may ask you to pay extra for essential components. Fees are clearly stated in the providers' Web sites, so be sure to look for and calculate all the add-ons. Most often overlooked are:

- **Data transfer fees** – Some providers charge for intra-cloud traffic, which means you will incur a hefty fee when you replicate your workloads to another data center or share data among geographically dispersed cloud regions. Other providers, like IBM SoftLayer, allow you to use their cloud network at no charge, anywhere in the world.

- **Free tiers** – It's common for providers to offer a certain amount of cloud capacity and networking at no charge. But the free tiers vary not only in capacity, but also in how the capacity is allocated. The most generous free tiers apply per-unit, rather than per-account.
- **Technical support** – Enterprises have learned that the “self-service” cloud is actually astoundingly complex to deploy. Fifty-two percent of IT decision-makers say that they are hindered by the lack of cloud expertise in their organization; and fully 91% of businesses have or plan to turn to a third-party for assistance in implementing their cloud strategy. So, you can expect your team will need assistance with your cloud deployments. But will you be forced to pay extra for the help you will need? With some providers, you'll need to pay a percentage of your total spend if you want to be able to call a technician. With others, customer service is a standard part of the service offering.

Low Rates May Come with Onerous Conditions

No one wants to pay more than necessary for cloud services. But in some cases, the most attractive per-instance rates are only available with conditions that may be counter to your goals. For example, low rates may require volume and term commitments—which are fundamentally at odds with the “on demand” nature of the cloud. Furthermore, some providers require all or partial upfront payments to lock-in the lowest rates—a condition that may run counter to some companies' accounting practices.



57% of IT decision-makers cite migration challenges as a major deterrent to moving workloads to cloud.



Beware Unexpected Migration Costs

Fifty-seven percent of IT decision-makers cite migration challenges as a major deterrent to deploying cloud workloads. It comes as an unwelcome surprise to infrastructure managers to learn that the virtual machines (VMs) deployed on premises are not the same as the virtual machines used by some leading cloud service providers. For example, businesses that use the leading enterprise hypervisor, VMware's popular vSphere, cannot simply move their VMs to AWS or Microsoft Azure; instead, they create new VMs on the cloud providers' own hypervisor platforms. The effort introduces direct costs (in terms of labor) as well as lost opportunity costs (associated with application downtime). It also stifles IT agility, since VMs may need to be newly created with each infrastructure move; for example, if workloads are moved to another cloud or back on-premises. Note that this challenge is not endemic to all cloud service providers. IBM SoftLayer supports the VMware hypervisor, which means that enterprises can seamlessly migrate VMware VMs from the premises to the SoftLayer cloud and back again.

HOW TO ASSESS IT ECONOMICS FOR CLOUD WORKLOADS

If your business priorities include maximizing IT value while minimizing costs, then you must take the steps to conduct an economic assessment for your workloads. The effort does not have to be onerous. It involves calculating costs to run the workload in your data center and in each vendor's cloud; calculating "yield" or performance; and putting the results together to derive a "like" unit you can use to compare across cloud vendors. Here are the steps to take:

Calculating Costs to Run the Workload in Your Data Center

Over half of businesses surveyed by Stratecast have adopted a "cloud-first" approach, in which they first consider cloud-based options for new applications. That often makes sense, especially for businesses that have not yet optimized their premises data center into a private or hybrid cloud. But is cloud always the most cost-effective option? And what about legacy applications—how can you determine the right environment?

Start your assessment by calculating costs for running the workload in your existing data center.

- **Determine the capacity requirements to run the workload (processor, storage, network, security).**
 - For a legacy application, is the equipment nearing its end-of-life? Calculate capital costs for upgrading or replacing current equipment.
 - For a new application, do you have sufficient capacity on premises to handle the load? If not, calculate the capital costs to add equipment.
 - Apply depreciation/amortization calculations, according to your business rules.
- **Consider application needs for consistent performance.**
 - Is current infrastructure sufficient to meet application performance parameters? Is the workload volatile, requiring additional capacity during peak usage times?
 - Calculate capital costs for adding capacity; or configure the workload to "burst" into the cloud.
- **Estimate utility costs to run the workload (power, cooling).**
- **Determine incremental network service costs.**
- **Calculate loaded labor costs, including:**
 - Time to implement, configure, and test the new hardware.
 - Integration of new inventory into current data center and facilities management software.
 - Deploying application software.
 - Training IT staff.
 - Ongoing management of the infrastructure to meet application performance and security parameters.

If your infrastructure management platform provides sufficient granularity, you should be able to provide a workload-level look at costs and price-performance for running your applications on premises. That data can be your guide as you move to the next step: doing the calculations that will help you compare cloud options.

Calculating Topline Costs to Run the Workload in the Cloud

In this effort, you will map your workload requirements to each cloud vendor's service.

- 1. Determine the best-fit cloud unit or instance for each vendor.**
 - How much compute capacity, memory, and storage do you need for the workload, based on current consumption?
 - Do you need persistent memory?
 - Note: ideally, you should be able to select a cloud unit that contains the exact amount of compute, memory, and storage you need. However, as noted earlier, many cloud service providers utilize “t-shirt” sizing, with pre-determined combinations of compute, memory, and storage capacity. If the cloud vendor does not offer a unit that matches your needs, you will have to settle for a “closest fit,” based on the dimension (compute/memory/storage) that is most important to the workload. You will likely have to “round up” in at least one dimension, buying somewhat more capacity than you need.
- 2. Determine your data transfer and network requirements.**
 - What volume do you anticipate flowing in and out of the cloud environment?
 - Is the traffic steady or dynamic?
- 3. Determine the type of cloud infrastructure you prefer or need.**
 - Do you want multi-tenant, single-tenant, bare metal, or do you have no preference?
 - Note: Don't let your preconceived assumptions limit your research. While bare metal may garner higher per-unit rates than single- or multi-tenant, it may in fact be less expensive when all costs are considered—even for non-critical workloads.
- 4. Determine the time frame to use in your calculations.**
 - Do you prefer hourly, monthly, annually, or 3-year terms? Some vendors offer a discount for long-term commitments.
 - How confident are you that your needs will remain steady for a year or more? Are you willing to be locked in to a vendor with a long-term commitment?
- 5. Determine how you prefer to pay.**
 - Do your company accounting policies favor a pay-per-use plan, or are you willing to pay upfront (with volume and term commitments) for a discount?
 - If you elect a volume commitment, how confident are you that your volume needs will not decline during the committed term?

6. Determine staffing needs for deploying the cloud workload.

- How will you migrate, deploy, and manage your cloud workloads? Do you have sufficient expertise on staff; or will you rely on the vendor's technical team, or a third-party service provider?
- Note that the vendor's services can impact your own staffing in two ways:
 - Some vendors charge a fee for basic technical support, with escalating fees for greater support. If your team is less experienced with the vendor or with cloud in general, you will need to calculate in the fees.
 - Vendors' cloud platforms are not equally intuitive, functional, comprehensive, or interoperable. Unless the cloud platform is interoperable with your current management or development platforms, you may need to specially hire or train staff to operate the cloud platform as a separate technology.

Note that many cloud service providers offer some sort of cost-calculator tool on their Web site. If you use the calculators, understand which of these cost components are included. If any of the components listed above are missing from the online calculator, be sure to add them to the total in your own spreadsheet.

Calculating “Yield” for Each Workload

Many businesses are better at adding up costs than understanding what they get for what they pay. In fact, in Stratecast's research, only 14% of cloud decision-makers said the vendor's ability to optimally run a workload is a primary consideration in selecting a cloud service provider. But given the significant difference in “yield” (or the “unit of work” that is produced) from different cloud vendors, it's worth calculating. Furthermore, the effort can benefit your business as a whole, especially if your goals include greater visibility into business operations. Because the unit of work is related to the business function supported by the workload, rather than an IT metric, this initiative can result in a valuable partnership between IT and line-of-business leaders.

Here are some tips for calculating yield values:

1. **Determine the best “yield” measurement per workload** (usually related to how the business measures the function being supported). For example:
 - For an analytics workload: the number of input/output queries handled per hour
 - For a dynamic Web application: the number of user-requests processed per second, on average
 - For a messaging application: the volume of throughput
 - For cloud backup and recovery: the recovery time objective
2. **Translate the value of the technology-based “yield” into business value.** For example:
 - For analytics workloads, what does it mean to your business to have 10% faster processing? Metrics may relate to analyst productivity and/or customer experience.
 - For Web applications, how does the business benefit from faster processing times? E.g., fewer abandoned transactions leading to increased revenue and/or greater user satisfaction.
 - For messaging applications, does increased throughput lead to greater user satisfaction and productivity?

Adding it All Up

With the appropriate calculations in hand for each vendor's solution, and a basic understanding of how performance impacts your business, you're in a position to compare IT and cloud economics.

Here are the steps to take:

- 1. Calculate the total costs to run your workload with various on-premises and cloud scenarios.**
- 2. Determine (to the extent possible) the performance associated with each solution.**
 - For on-premises options, utilize information from your IT performance management system.
 - For cloud services, this information is generally available on the cloud provider's Web site, and may be presented as an average or as a maximum. If you're not sure what vendors' claims represent, it's worth contacting them.
 - Note that performance metrics are usually not backed by service level agreements, which means that vendors' claims may not represent actual performance.
- 3. Use costs and performance (yield) to determine a common measure of price-performance that can apply across all vendors, as well as on-premises options.**

CALCULATING CLOUD ECONOMICS: IS THE EFFORT WORTHWHILE?

The approach outlined above provides a useful and reliable way to compare costs and performance across all vendors, as you make your cloud provider decision. But are the differences in cloud price-performance significant enough to justify the effort? For an increasing number of businesses determined to optimize their cloud investments, the answer is "yes."

In the past year or so, a number of independent research firms have begun conducting benchmark research, designed to track and report costs to run workloads in various vendors' clouds. The cloud providers themselves have also begun to acknowledge that enterprises need more than a steady stream of unit price decreases to understand and predict their costs.

The greatest value of the recent attention to cloud costs is that assumptions regarding "low price providers" have been skewered. Recently, Stratecast reviewed results of a study in which IBM ran duplicate workloads on IBM SoftLayer, Amazon Web Services, and Microsoft Azure cloud services, over a period of time, to derive average performance metrics. For several common business use cases (e.g., virtualized Web applications, storage-intensive analytics, messaging apps), the results showed that IBM SoftLayer cost less and delivered greater performance than its competitors.¹ While every scenario is different, the clear takeaway is that, with some due diligence and an open mind, enterprises can potentially cut costs in half and improve performance of their cloud workloads.

¹ For details on the test methodology and results, see *Cloud IT Economics: What You Don't Know About TCO Can Hurt You*, available here <http://www.ibm.com/common/ssi/cgi-bin/ssialias?htmlfid=KUJ12454USEN>

THE LAST WORD

Businesses have high expectations of the cloud. They expect agility, scalability, budget-friendly pay-per-use pricing, high performance, and (topping the list of cloud drivers) low costs. Unfortunately, too many businesses *assume* they are getting an optimal deal from their cloud provider; and they are shocked when budgets soar and performance vacillates.

As the cloud market matures, IT leaders will seek to maximize the value they derive from their cloud investments. This means engaging in due-diligence during the initial vendor selection process, as well as ongoing tracking of price-performance for business workloads. The effort will require an understanding of differences in vendors' cloud service configurations and pricing. It will also require due-diligence within the business, to understand the cost risks associated with cloud migrations and deployments (including staffing issues and productivity hits), as well as the key business metrics that can help define success.

Cloud services are no longer a novelty sandbox for developers; they have become the centerpiece of enterprise hybrid IT strategies. As such, it is time for business leaders to approach the choice of vendor with a high degree of rigor. Only by understanding the complexities of different vendors' services and pricing can they assure they are achieving the highest possible value. The benefit to the business and to the IT department will be well worth the effort.

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