FOUR WAYS TO GROW A CLOUD BUSINESS THROUGH DATA CENTER MODERNIZATION
INTRODUCTION

There is an adage that there are only four ways to grow a business: get more customers, get them to pay more for your services, get customers to complete more sales transactions with you, and cut your costs delivering your services. Although these strategies are simple, they can be powerful: getting every customer to pay a little more can have a huge impact on total revenues; similarly, extending the lifespan of a customer so that they complete more transactions with you is the easiest sale you can make.

For cloud service providers (CSPs), these four strategies can provide a helpful lens for reviewing the effect of data center modernization. In this paper, you will see how updating the data center can have an impact on the bottom line, and help you to create a foundation for a sustainably growing business.

THE CSP CHALLENGE

The context for this discussion is an intensely competitive market for cloud services, including Infrastructure as a Service (IaaS), Platform as a Service (PaaS) and Software as a Service (SaaS). Hyperscale cloud providers dominate some parts of the market, and differentiation is vital in order to compete.

Increasingly, there are opportunities to offer specialized services, such as video encoding or stitching and AI-enhanced workloads on demand. These services require more performance from the underlying computing platform, though, and will require modern hardware to support with competitive efficiency. Live-streamed video content must be transcoded in real time into a format appropriate for the destination device, placing a heavy demand on the server that is sensitive to both absolute latency and sustained throughput. Artificial intelligence techniques are increasingly utilized to enhance the functionality or profitability of existing workloads, such as to improve the relevance of ad placement in pursuit of higher click-through rates, but the compute intensity of such algorithms materially slows server throughput performance (see Figure 1). This effectively decreases the number of transactions that the infrastructure can support, and proportionally increases the effective cost per transaction. It is a challenge to balance the need for innovation against the need for cost-effective performance. In this paper, we will show how data center modernization can help.

Figure 1. ML/DL improves service targeting but increases TCO & reduces efficiency
One of the four strategies for growing a Cloud business is to cut the cost of delivering services, thereby increasing profitability and ability to invest in innovation.

Data center efficiency is a good place to begin because as workloads become increasingly demanding, it can be expensive to support them with an ageing infrastructure. If servers are underperforming, it will take more of them to deliver a workload, which also has an effect on the cost of data center space, power and cooling. The penalty for sub-optimal power and space efficiency may scale linearly, such as that incurred by a CSP paying co-location costs in shared data centers, or non-linearly, such as that incurred by a CSP out-growing their existing DC capacity.

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If the CSP is able to increase the effective capacity and derive more value from the existing infrastructure footprint, that could postpone or even eliminate a multibillion-dollar construction bill.

Pushing to acquire new customers without first addressing efficiency can only intensify the challenges of trying to serve today’s workloads with yesterday’s infrastructure.

**Improving infrastructure performance**

For a CSP, an important metric is how much money you can make per rack. One way you can optimize that is by upgrading the hardware platform so it can support more virtual machines (VMs), and therefore more customers. For example, refreshing a four-year old server platform with the new Intel® Xeon® Scalable Processor Family may enable significantly more VMs to be supported per rack (see Figure 2). The business potential of the rack is effectively increased, and a substantial fraction of the total delivery cost (that is represented by the rack and its associated facility overheads) is cut. This provides the CSP with the option to offer more competitive pricing, or to use the greater efficiency to increase margins, or to strike some balance between those two goals.

**Adopting software defined infrastructure**

Optimizing at the rack level can have a dramatic effect on lowering costs, but there is also a strategic imperative to move towards software defined infrastructure (SDI), which can cut operating costs by up to 75 percent. SDI enables physical hardware resources to be dynamically composed into the optimal configuration for each workload. The automation frees data center managers from the task of re-partitioning hardware manually, and enables underused resources to be re-allocated easily. Intel® Rack Scale Design (Intel® RSD) can be used to pool and deploy compute, storage and network resources. Backed with an open API and open-sourced reference software, Intel RSD also enables innovative new applications to be created for further optimization. Intel’s Cloud Infrastructure Maturity Model for Cloud Service Providers outlines the journey that CSPs can take towards greater efficiency and flexibility (see Figure 3). In 2017, CSPs tended to sit between stages two and four, but market leaders are already using SDI and benefiting from its lower cost base and competitive advantage.

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**Figure 2:** The new Intel® Xeon® Scalable Processor Family enables more virtual machines to be accommodated per rack, pushing down the total cost of ownership.

**Figure 3:** The Intel Cloud Infrastructure Maturity Model shows the journey towards SDI (Stage 4), and beyond. Source: Intel (2017) Build A Better Cloud ebook.
The key to winning more customers in the face of intense competition is to be able to differentiate the service offering. Having a differentiated service eases the pressure to compete on price, and enables the CSP to compete on quality and service features.

One way to differentiate the service is on performance. Bare Metal as a Service (BMaaS) provides a dedicated server environment with cloud agility, scalability and flexibility. Big data analysis and latency-sensitive applications such as financial trading tend to experience “noisy neighbor” problems in a shared environment, and so are usually hosted on bare metal. With the latest processors offering up to 28 cores, six memory channels, and 48 PCIe lanes, it’s now possible to deliver even faster performance for these applications, potentially creating a competitive differentiator for both the CSP and the CSP’s client.

By using the latest processors for the virtual environment, it may also be possible to host applications the cloud that have previously required a dedicated server, creating new business opportunities for CSPs. As well as being able to allocate more cores to a virtual machine instance, CSPs can use Speed Shift Technology to set a particular core to run at a higher frequency and voltage. This enables the CSP to offer a wider range of performance levels for different workloads, potentially enabling a wider menu of price and service options.

Specialist workloads are becoming important as a way for CSPs to add value over and above the infrastructure. Because of the huge data volumes involved, many companies can only perform operations such as media transcoding, artificial intelligence analysis, and media streaming using the public cloud. Setting up the software and deploying it can be a barrier, though. If a CSP can offer a simple solution, with pre-installed and optimized software, and support where needed, there is the potential to win new customers who are willing to pay a premium over and above the cost of the infrastructure.

For more information on the steps CSPs can take to make money from services like these, see the Intel white paper Making More Money from the Cloud: A Guide for CSPs.

**Optimizing artificial intelligence**

Certain processing-intensive workloads like the fast-growing adoption of machine learning inference can be greatly accelerated using the latest processors, increasing the potential billable business per rack. This is enabled by substantial increases in vectorized performance.

Vectorization is a processor capability that enables one command to process multiple data items in parallel. The Intel Xeon Scalable Family introduced Intel® AVX-512, enabling 512 bits of data to be processed at the same time, doubling the 256 bits supported by Intel® AVX2 on the previous processor generation.

For an inference workload, upgrading to a new 24-core processor from a previous-generation 18 core processor, and optimizing the application for Intel AVX-512, can reduce latency. This can improve capacity, or enable a higher level of service to be delivered. Both approaches have an obvious effect on the billable business per rack, by increasing capacity or increasing the possible price point.

**Delivering FPGAs as a Service**

Performance can be further optimized by using Intel® Field Programmable Gate Arrays (Intel® FPGAs), which are accelerators designed to boost the performance of large-scale data and analytics systems. They can be used to accelerate algorithms for compression, encryption, transcoding and data filtering, among others. Most prospective cloud customers lack the specialized staff and expertise required to take advantage of FPGA technology, though.

At the cutting edge of cloud service provision is the ability to offer FPGAs as a service, hosting highly optimized applications in the cloud for premium clients. Taking on the complexity and offering indirect access to the specialized skill set required represents a value that the industry has yet to place a price on. CSPs who seize leadership here have a unique opportunity to become trusted long-term partners to clients with some of the most demanding workloads.
An important approach to growing the business is to increase the average revenue per customer. There are two ways to effectively achieve this:

1. Increase prices
   This is perhaps the most obvious way to get more money from each customer, but in an intensely competitive market, customers might just leave instead. It may not be possible to increase the price without improving or otherwise differentiating the service. Modernizing the data center to deliver faster performance could enable customers to get more value from their cloud workloads, making it easier to justify a price increase. For example, customers might benefit from more timely analysis to help with fraud identification, moderation of online content or targeted advertising. CSPs may also be able to charge a premium for higher performing virtual machines.

2. Sell more services per customer
   If a CSP can satisfy more of a customer’s needs, there is the potential to win additional business. According to 451 Research, companies expect their spending on value-added services (such as security, managed services and SaaS) to double over the next two years. Enterprise workloads that are expected to grow in importance include big data; business intelligence; and virtual desktop infrastructure and mobility management.

Big data workloads and business intelligence applications will require servers that can work with huge data volumes; and virtual desktop infrastructure is highly sensitive to latency. CSPs can prepare to bring these workloads into the cloud now, by modernizing the infrastructure.

Extending the service portfolio beyond infrastructure to include specialist services such as media transcoding and streaming, or artificial intelligence analysis, can also create fresh upsell opportunities that add value to existing cloud-based workloads. In the case of artificial intelligence, if customers are already hosting data with a CSP, it can be a significant advantage to be able to analyze that data to derive business insights. For more advice on developing new CSP services, see the white paper Making More Money from the Cloud: A Guide for CSPs.

INCREASING AVERAGE REVENUE PER CUSTOMER
When companies draw up growth plans, they often think first of acquiring new customers, but retaining existing clients is also vital. It can cost between five and 25 times more to win a customer than it does to retain one, so one of the most sustainable ways to grow the business is to keep customers renewing for longer. Each contract renewal is a decision point for the customer, so the customer needs to be satisfied that their choice of CSP is still the best option. If the CSP can deliver performance improvements and offer new services, as described earlier in this paper, that will demonstrate a culture of innovation and reassure customers that the CSP is not resting on its laurels.

There is an additional challenge to address, though: security. Data breaches are hitting the headlines regularly, and the companies affected are suffering reputational damage and clean-up costs counted in millions of dollars. To retain business, as well as to win it, it will be increasingly important for CSPs to demonstrate that the infrastructure and its workloads are protected using the latest security technologies, and able to attest compliance with the latest regulations. Forrester Research expects global spending on cloud security solutions to grow by 28% over the next five years, reaching a total of $3.5 billion by 2021. This a huge potential market for CSPs who can participate.

Intel offers several technologies which can help to increase the security of the data center. Intel® Cloud Integrity Technology (Intel® CIT), used in conjunction with VMware vSphere* 6.5, can be used to establish a trusted boot environment, so that virtual machines will not boot if moved to an untrusted server. Intel® Key Protection Technology (Intel® KPT), new in the Intel® Xeon® processor Scalable family, enables encryption keys to be stored in hardware without being exposed in main memory on the server.

Additionally, there is the potential for encryption keys to be managed by the customers themselves. This not only gives customers a greater sense of security for their cloud workloads, but also liberates CSPs from the liability and associated costs of managing encryption keys.
Modernizing the data center enables CSPs to compete and potentially thrive in the face of intense competition. Offering new services based on the latest technologies can help to attract new customers, and upsell existing customers, with the potential to increase the average revenue per customer and per rack. Enhancing existing services with improved performance and enhanced security can help to retain customers. At the same time, optimizing the data center can drive down costs. This enables the CSP to maintain competitive pricing or improve margins so they are in a stronger position to invest in innovation.

Find out more. Visit intel.com/CSP

* Test results have been estimated based on internal Intel analysis and are provided for informational purposes only. Any difference in system hardware or software design or configuration may affect actual performance.

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1. 1-Node, 2 x Intel® Xeon™ Processor E5-2690 on Romley-EP with 256 GB Total Memory on VMware ESXi® 6.0 GA using Guest OS RHEL6.4, glassfish3.1.2.2, postgresql9.2. Data Source: Request Number: 1718, Benchmark: SPECvirt_sc* 2013, Score: 377.6@21 vs 1-Node, 2 x Intel® Xeon™ Platinum 8160 Processor on Wolf Pass with 768 GB Total Memory on VMWare ESXi® 6.0 Update 2 using RHEL6.4 guest OS PostgreSQL9.2, glassfish3.1.2.2 apache-tomcat-7.0.47 doovot-2.2.5, fastcgi2.4.6. Data Source: 2600, Benchmark: SPECvirt_sc* 2013, Score:1256@71 VMs if after 4 years the CapEx cost is roughly on par between the two systems, doubling the performance cuts the cost per unit performance in half.


3. Pathfinder report: Cloud Service Providers - Meet your future customer, June 2017, 451 Research

4. Pathfinder report: Cloud Service Providers - Meet your future customer, June 2017, 451 Research

5. https://hbr.org/2014/10/the-value-of-keeping-the-right-customers