

SHOULD I OUTSOURCE MY IT INFRASTRUCTURE?

**AN INSIGHTFUL TCO ANALYSIS OF ON-PREMISES VS. MANAGED
HOSTING SERVICES**



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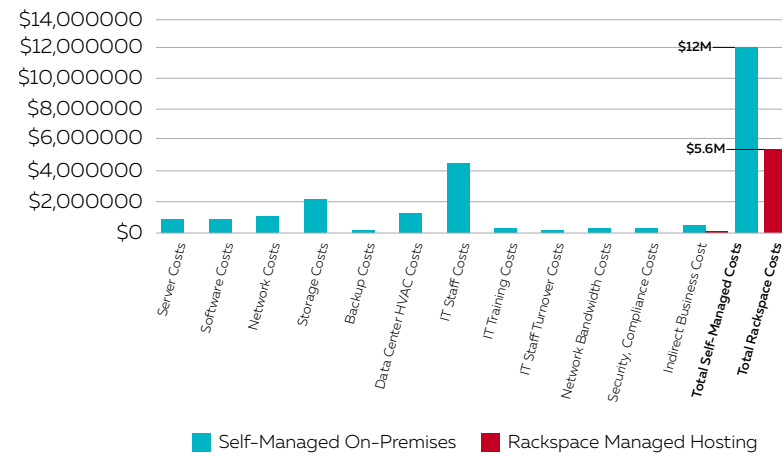
EXECUTIVE SUMMARY

Managed hosting is an IT service model that provides companies with dedicated, single-tenant, leased infrastructure from a managed services provider. The solution includes servers, software, storage and networking and can also include specialized services like managed security¹. Companies choose their OS, and the service provider handles the administration, management, support and security. Resources are not shared, so companies receive the full performance capabilities of the leased infrastructure. Managed hosting offers the strategic benefits of IaaS², cost reduction and of moving on-premises IT infrastructure, systems and applications to the cloud³. Its enhanced security and protected environment make managed hosting a logical choice for companies regulated by PCI, ISO, SOX and FISMA. As proof, over half of all companies recently surveyed by Tech Pro Research reported decreased risk following an IaaS implementation² in the cloud.

This white paper provides a comprehensive TCO analysis of Rackspace® Managed Hosting for an upper mid-size, US-based, financial services company with \$500 million annual revenue and 500 employees. This company ran business-critical legacy applications in its own data center, but aging equipment, increased growth and stricter regulatory requirements required a technology upgrade to facilitate its strategic plan. The company required a three-year TCO summary analysis to evaluate its on-premises versus managed hosting options, plus detailed data tables for a five-year forecast period.

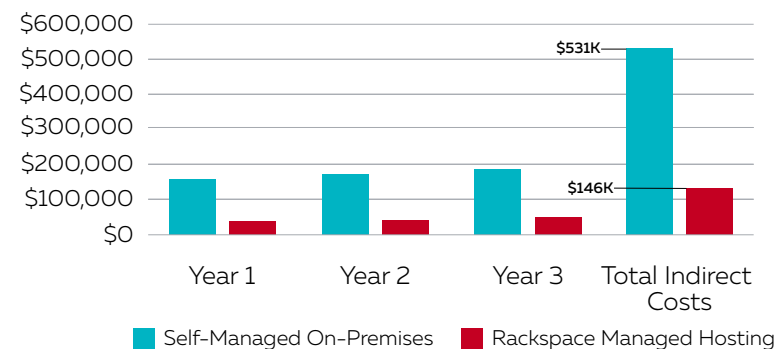
The three-year summary analysis showed the company would achieve a 53 percent direct cost savings by migrating to Rackspace Managed Hosting. Upgrade of on-premises technology was estimated to cost \$12 million. Of this amount, \$4.1 million was capital expenditure (capex) and \$7.8 million was operational expenditure (opex). Rackspace Managed Hosting totaled \$5.6 million. Of this amount, capex was zero, and \$5.6 million was opex. The total three-year cost savings fell squarely on the 35 - 85 percent bell curve predicted by the financial model within two standard deviations from the mean. The chart below compares on-premises versus managed hosting options for ABC's legacy applications using the 12 TCO cost categories analyzed in this white paper.

**Three-Year TCO Summary
Self-Managed vs. Rackspace Managed Hosting**



Indirect cost savings were estimated at 73 percent, or roughly \$385,000, with indirect costs of \$531,000 for self-managed on-premises versus \$146,000 with managed hosting, over a three-year period.

**Three-Year Indirect Cost Summary
Self-Managed vs. Rackspace Managed Hosting**



A detailed explanation of the TCO cost categories analyzed in this white paper is provided in the sections that follow.

During the TCO analysis, ABC company discovered two unexpected outcomes that factored heavily into their decision to migrate their legacy applications to Rackspace Managed Hosting rather than keep them on-premises.

First, the cost of upgrading their on-premises security services, tools and staff to fully comply with financial industry regulatory requirements⁵ was more than expected. As shown in Table 1 in the body of this white paper and the Security, Compliance and Risk Mitigation table in the appendix, it would have cost the company \$113,000 for security services and tools, plus \$301,013 for two Imperva Web Application Firewalls in year one to upgrade or add the necessary security components. ABC chose to obtain those capabilities by including Rackspace Managed Security in their bundled solution. This approach allowed them to jumpstart cloud deployment and increase application security⁶.

Second, the cost of increasing their WAN network bandwidth was significant because the company would have to purchase two pair of Cisco ASR1001-X aggregation routers. ABC chose to obtain that equipment by including it in the Rackspace Managed Hosting solution and treating it as opex.

INTRODUCTION

Over the past 10 years, IT infrastructure has evolved from a capital asset that resides in a company's own data center to an operational expenditure whose assets reside at a service provider's hosting facility in the cloud. One effect of this change is that traditional internal resource silos, which used to require time, effort and budget dollars to manage and maintain, have been replaced by external, efficient, cost-effective services that reduce IT complexity and improve the delivery of IT to the business. Today, more than at any time in the past, IT is positioned as a business enabler and a component of transformational change for companies across all industries. We are no longer at a point where cloud computing is a trend. It's become an integral part of the IT strategy. The challenge for IT today is deciding which workloads to migrate off-premises into the cloud, when to migrate those workloads and choosing the right technology platform to manage the transition to the cloud⁷.

In the same time period, the financial services market has experienced massive disruption. As fintech and non-traditional players rapidly eclipse innovation and service delivery models, traditional banks and financial services institutions struggle to keep up. As consumers spread their attention – and dollars – across a wider net of financial institutions and services, brick-and-mortar outlets are being outpaced in their ability to deliver unique and compelling products. Additionally, the mandate to maintain bullet-proof security across more customer channels (branch, web, mobile) while adhering to increasingly stricter compliance and regulatory requirements has added even more burdens to strapped IT teams in banking, insurance, investment firms and software vendors serving the finance market. Even fintech companies, born in the cloud and laser focused on innovation, struggle to stay abreast of the shifting regulatory landscape while staying on the cutting edge.

And the key to reducing IT costs, minimizing capital expenditures, improving customer experience and getting to market faster, lies in cloud adoption. In all of its forms, cloud-based resources are becoming a matter of survival for financial services organizations. According to a report from the Financial Executives Research Foundation (FERF), 72 percent of U.S. finance executives said they were either using cloud-based solutions in 2017, or they planned to do so in the future. Meanwhile, only 7 percent of financial services CEOs say their firms are prepared for innovation.

IT teams in the financial services industry are migrating workloads to the cloud to reduce IT costs, minimize capital expenditures and more efficiently manage and operationalize the budget. Other benefits include improved IT flexibility, scalability and reduced complexity when compared to the alternative of building out on-premises IT infrastructure and increasing staff. ABC Company, for example, found that protecting and securing its IP assets and customer information was more effective and efficient through a top-tier cloud services provider serving as a strategic partner⁷. This had a direct impact on lowering the cost of maintaining regulatory compliance with financial industry standards. Companies looking for a path to the cloud and better ways to host custom, legacy applications that are not considered cloud-native may find that their cloud journey takes them beyond traditional on-premises architectures into the realm of managed hosting.

Managed hosting is an attractive entry point into the cloud for companies of all sizes because it provides a safe, learn-as-you-go approach to implementing more complex cloud architectures which require a broad commitment to standard cloud platforms from industry giants such as Microsoft[®], Amazon and Google. For companies managing applications that are not considered cloud-native, the cost and risk of conversion to the new platforms may override the benefits. They want to embrace the benefits of the cloud, but the choice is not a simple one.

Managed hosting cloud environments are implemented with dedicated compute, network and storage infrastructure for the exclusive use of one corporate client. The name implies that the underlying infrastructure resides in data center facilities owned and operated by a managed cloud provider such as Rackspace, rather than in an on-premises data center owned and operated by the client.

Companies that choose to migrate to a managed hosting environment usually select a subset of their applications portfolio as the entry point. Numerous web resources are available that discuss which applications make good cloud candidates, some of which are highlighted in the references section of this document. This white paper focuses on the challenge that results when a company has a core business and/or web application that drives key internal processes and on the high cost and complexity of converting or rewriting those applications to run on a leading public cloud platform like Amazon Web Services, Microsoft Azure[®] or Google Cloud Platform. Refactoring and retooling these applications to a cloud-native design presents a high risk should something break in the conversion and also has a high cost in development hours that could instead be used to build new capabilities.

Managed hosting security, control, flexibility, scalability and performance requirements can be included as needed to fully address⁸ the governance and regulatory requirements from PCI DSS, SOX and FISMA. To protect client IT environments against Advanced Persistent Threats (APTs) and other cyberattacks, Rackspace, for example, offers Rackspace Managed Security.

This custom offering provides deep security knowledge, leading technology and advanced threat intelligence tailored to clients' business needs. It provides a 24x7x365 defense capability that actively hunts for threats in clients' cloud environments and, when threats are detected, takes ownership of responding to them immediately. This frees client IT staff to focus on the initiatives that drive the business and offers significant cost savings when compared to many in-house security solutions.

Managed hosting is well-suited for legacy and web application hosting, regulated workload hosting, data center transformation, high-performance computing (HPC), data storage and analytics, data backup, disaster recovery (DR), high availability, and test-development-operations integration (DevOps) use cases, with many companies having already completed the process⁷. Companies with those requirements should consider the potential benefits of migration as well.

Managed hosting benefits vary from company to company due to differences in owned vs. leased or licensed hardware and software assets. But the fundamental questions that drive the decision to move to a managed hosting environment never change: Does moving to the cloud make business sense? Do we have the necessary IT skills and experience to make the transformation? What are the investments, expenses and payoffs? How long will the migration and transition take? What are the business risks? How will existing cost structures be affected? These are all important business questions that must be answered before acting; however, many companies find analyzing the total impact on costs to be one of the most challenging decision criteria.

Based on a proven Total Cost of Ownership (TCO) modeling methodology built from extensive experience working with companies of all sizes, this white paper shows how companies can make a detailed, informed assessment of the financial drivers behind their decision to move all or part of their IT environment to a managed hosting environment.

Not all dollars are considered equal in business finance. When calculating the costs of purchasing, building and maintaining IT

infrastructure, a business will view a dollar spent on capex quite differently from a dollar spent on operating that infrastructure (i.e. opex). Capex and opex are subject to different accounting rules, and they reflect different values to the business. Capex spent on buildings, equipment and software is an asset carried on a company's balance sheet, whereas opex spent on services impacts the income statement and affects earnings.

What does this have to do with the business decision to migrate to a managed hosting solution? A lot. Both capex and opex figure prominently in determining the total cost of owning and managing IT infrastructure and in an IT manager's efforts to budget for IT costs. Together they serve to answer a basic question on the mind of every shareholder: "What is the company doing with my money, and how are the decisions the company makes driving growth and profitability?" The CEO is ultimately responsible for answering to shareholders, but the CEO's perspective on IT infrastructure expenditure will cascade down the management chain and inform the IT manager's thinking about the issue, as well as provide guidance on how to drive IT.

This white paper covers:

- The benefits of managing hosting services from Rackspace and explores why companies in the financial services sector benefit more from managed hosting than from other cloud computing environments, or from doing it themselves through on-premises upgrade and expansion.
- The challenge that results when a company's legacy applications have been flagged for non-compliance during an audit and the high cost remediating the compliance issues is significant.

OVERVIEW OF INFRASTRUCTURE ECONOMICS

The sections that follow offer explanatory information about TCO analysis as a computational process, about how ABC's IT environment was modeled and about the treatment of capex and opex in the TCO categories.

Total cost of ownership

From a TCO perspective, migrating to a managed hosting solution in the cloud can be a preferable alternative to building, buying and managing on-premises IT infrastructure and staff⁹. In the past, when cloud computing was in its infancy, there was a general concern that security and compliance risk were greater in cloud environments than with in-house, on-premises environments. But today, top-tier managed hosting cloud service providers like Rackspace offer ready-made and custom-configurable managed hosting solutions that provide highly secure, regulatory-compliant cloud computing environments that fully protect their client's IP and assets. These solutions are highly scalable and cost-effective. How is this possible? The evolving maturity of cloud computing technology and the broad implementation experience of managed hosting providers such as Rackspace have evolved and become more sophisticated over the years, to the point where managed hosting solutions can be fully leveraged by client businesses to offset capital expense, minimize IT creep and complexity, and decrease IT staffing costs that would otherwise be required if clients built out their own on-premises solution.

So how should companies estimate the TCO of migrating to a managed hosting solution in the cloud? First, by calculating how much their current IT infrastructure truly costs them to build, buy (or lease) and maintain. This task is not easy because there may be hidden or indirect costs to consider that may represent shadow expenses¹⁰, in addition to ongoing and ad hoc expenses that are well understood. To make an informed decision about migrating a specific IT environment to the cloud, its TCO must be determined by evaluating a wide variety of factors, and approaches to calculating TCO vary from one company to another in terms of accuracy. As a rule, the more thorough the analysis, the more valuable the TCO metric will be for making the right business decision.

To ensure accuracy, Rackspace uses Alinean, Inc's TCO methodology¹¹. The Alinean TCO methodology is credible as an independent, third-party reference because it considers the broadest range of potential costs, uses accurate historical financial models and data, and bases the analysis on realistic assumptions.

Alinean separates TCO into three basic cost categories:

- **Capital Costs (capex)** – defined as new purchases of hardware and software.
- **Operating Expenses (opex)** – including hardware and software support costs, personnel and related services.
- **Indirect Business Costs** – including the impact of downtime on productivity, the increase of business agility and other factors.

Modeling ABC company's infrastructure TCO

This white paper applies Alinean's TCO methodology¹¹ to ABC Company, a midsize to large US-based business in the financial services industry with on-premises IT infrastructure that it manages in its own data center. Disaster recovery is achieved through a hybrid solution that requires some local resources but is based primarily on a pay-per-use cloud DR model purchased as a service through an external provider. For this reason, ABC Company's disaster recovery environment is not part of the scope of this TCO study, but costs associated with the local backup of servers and data are included.

Over the past five years, ABC Company has grown substantially by opening offices in more states and by offering a broader range of financial services to customers. The company's IT resources that supported its core production workloads were reaching 90-95 percent of capacity at peak periods during the day, and the development environment had to be paired down to shift resources behind the higher-priority workloads.

With ABC's DevOps team facing increased pressure to roll out the next generation of their applications and also planning additional corporate expansion over the next five years, ABC reached an important decision point in its growth cycle. The budget and planning process were already underway for next year, and a large capital expense increase for on-premises IT expansion was unlikely. As a result, the company decided to evaluate other options, including the feasibility of moving some of its production applications and all the development workloads to the cloud as a managed hosting service. ABC wanted to ascertain if an outsourced IT model based on managed hosting might be a smart way to compete with larger competitors for a fraction of the cost.

The decision would be contingent upon a favorable TCO analysis and upon identifying an industry-leading managed hosting services provider that ABC could collaborate with to extend its technical footprint out of its existing data center and supplement its future IT staffing requirements, particularly in IT security and financial industry compliance.

ABC Company's IT configuration may look familiar if you are involved in managing IT infrastructure at a comparable company. ABC runs its legacy business applications on the Microsoft Windows® Server® 2016 Datacenter platform. Its core business applications use Microsoft SQL Server® as the database component, and all core business applications are bound by high-availability SLAs. ABC uses software to virtualize other dedicated servers that support production, development and test workloads, and the network is based on a combination of T1 and broadband fiber (FiOS) WAN links. However, the company plans to phase out the dedicated T1 links in favor of a more scalable broadband solution through their ISP. The part of ABC Company's IT configuration that pertains to this TCO study is shown in the table that follows.

IT CONFIGURATION

DATA CENTER	MAIN LOCATION
SERVERS	
Dell PE R740xd (Xeon SP Dual) (2ch x 16co) - 384GB	5
Dell PE R740xd (Xeon SP Dual) (2ch x 16co) - 384GB	5
Dell PE R740xd (Xeon SP Dual) (2ch x 20co) - 384GB	5
Dell PE R740xd (Xeon SP Dual) (2ch x 20co) - 384GB	5
Dell PE R740xd (Xeon SP Dual) (2ch x 4co) - 768GB	2
Dell PE R740xd (Xeon SP Dual) (2ch x 4co) - 768GB	2
Dell PE R740xd (Xeon SP Dual) (2ch x 8co) - 196GB	12
TOTAL SERVERS	36
NETWORK EQUIPMENT	
Cisco ASA 5525-X	2
Imperva WAF (x4510, 1 Gbps)	2
F5 BIG-IP 5200 (HA) with LTM + AFM	2
Cisco ASR1001-X - HA	4
Cisco 9372-TX - HA	6
Cisco 9372-PX - HA	2
Brocade DS-6520B 48 ports	2
TOTAL NETWORK EQUIPMENT	20
DATA CENTER	
SECURITY AND RISK MITIGATION TOOLS	
Vormetric Encryption and Key Management	1
CrowdStrike (host visibility and malware prevention on quest system)	1
Splunk (big data ingestion and processing providing real-time query and alerting)	1
Rapid7 (with VA scans)	1
AlertLogic (TM, LM)	1
Tanium (endpoint management)	1
ServiceNow (ticketing for security operations, CMDB)	1
INDIVIDUAL PRODUCTS INCLUDED	7

IT CONFIGURATION (CONT.)

STORAGE	
Dell EMC Unity 400 Hybrid Flash (dSAN)	1 388 TB
TOTAL STORAGE	1

Capex vs. opex in the TCO categories

Some of the categories involved in this TCO analysis are purely operational and affect only opex. For example, IT staff salaries are an operating cost. There is no direct capital investment required to hire people if you exclude office facilities and related expenses. Other TCO categories break out into both a capex and an opex figure. Server hardware, server software, network infrastructure, storage, backup and power, and facilities all contain capex and opex expenditures.

The breakout occurs because in each of these categories, the purchase of the hardware or software asset invariably triggers a related, recurring maintenance charge. Typically, the numbers are in proportion. The higher the asset price, the higher the support fee will be. Software maintenance is usually around 25-28 percent of license costs each year.

TCO SUMMARY

ABC Company uses a three-year TCO financial analysis period for decision-making but also requires forecast data for years four and five in the detailed tables that support the analysis. Table 1 below summarizes the results of this TCO analysis on ABC Company's IT environment over the required three-year period. The TCO of an IT infrastructure upgrade to support business growth and the migration of legacy applications during that period, if undertaken, will be roughly \$12.9 million. The company will need to add new hardware, software and IT staff to enhance the functionality, performance and security of its existing IT environment. The company will spend \$4.1 million on capex, \$8.2 million on opex, and \$0.5 million on indirect costs. Detailed information about each of these summary numbers is provided in the report sections that follow.

TABLE 1: THREE-YEAR TCO SUMMARY OF ABC COMPANY'S INFRASTRUCTURE

SELF-MANAGED ANNUAL COST DETAILS	YEAR 1	YEAR 2	YEAR 3	TOTAL
CAPITAL COSTS (CAPEX)				
Server hardware costs	\$123,419	\$82,285	\$680,492	\$886,197
Server software license costs	\$461,840	\$23,092	\$24,247	\$509,179
Network infrastructure costs	\$855,988	\$42,799	\$44,939	\$943,727
Storage costs	\$1,307,366	\$250,034	\$260,348	\$1,817,747
Backup infrastructure costs	\$18,000	\$1,050	\$1,103	\$20,153
TOTAL ANNUAL CAPITAL COSTS	\$2,766,613	\$399,260	\$1,011,129	\$4,177,002
OPERATING EXPENSES (OPEX)				
Server hardware support costs	\$40,783	\$46,409	\$50,159	\$137,352
Software support costs	\$115,460	\$121,233	\$127,295	\$363,988
Network infrastructure support costs	\$68,479	\$71,903	\$75,498	\$215,880
Storage warranty costs	\$125,052	\$148,969	\$173,871	\$447,893
Data center power and facilities cost	\$415,808	\$436,599	\$458,429	\$1,310,836
System administration labor costs	\$1,475,888	\$1,571,820	\$1,673,988	\$4,721,696
IT training costs	\$124,950	\$128,074	\$131,276	\$384,299
IT staff turnover costs	\$13,113	\$13,441	\$13,777	\$40,330
Network bandwidth costs	\$70,740	\$77,814	\$85,595	\$234,149
Security, compliance and risk mitigation costs	\$113,000	\$122,040	\$131,803	\$366,843
TOTAL ANNUAL OPERATING EXPENSES	\$2,563,273	\$2,738,301	\$2,921,692	\$8,223,266
INDIRECT BUSINESS COSTS				
Indirect Cost Realization Factor	20%			
Unplanned downtime - productivity impact	\$14,685	\$16,154	\$17,769	\$48,608
Planning downtime - productivity impact	\$8,010	\$8,411	\$8,831	\$25,252
Business agility - productivity impact	\$53,425	\$58,767	\$64,644	\$176,835
Unplanned downtime - business costs	\$9,680	\$10,648	\$11,713	\$32,041
Planning downtime - business costs	\$63,360	\$69,696	\$76,666	\$209,722
Business agility - revenue impact	\$11,753	\$12,929	\$14,222	\$38,904
Total Annual Business Costs	\$160,913	\$176,604	\$193,844	\$531,361
TOTAL	\$5,490,800	\$3,314,165	\$4,126,664	\$12,931,629

TCO ANALYSIS DETAILS

The sections that follow offer an expanded five-year view of detailed data and explanatory information about each TCO analysis category summarized in Table 1.

Server hardware

Server hardware costs depend on processor speeds, memory and other technology-based factors. Server hardware is a direct capex cost from an accounting perspective. The Server Hardware table in the appendix at the end of this white paper shows pricing and feature details for servers that will be upgraded or added by ABC Company as a part of its infrastructure upgrade project. The advanced Intel® Xeon® scalable processor architecture that ABC utilized was more than capable of expansion, but upgrade costs to the next tier rise quickly with each increase in processor speed, memory and storage. The three-year server hardware cost projection (with forecast years four and five included) is shown in Table 2 and reflects the assumptions that ABC will add server capacity at a growth rate of 5 percent a year. In year one, the company must buy (incrementally) 12 servers, for a capex expenditure of \$93,759. In years two through five, it buys two to three more servers per year to accommodate growth. By the end of year five, ABC will have 62 servers to manage. Assuming a 36-month replacement cycle for server hardware, ABC must purchase 36 replacement servers in year three, 12 servers in year four, and three servers in year five. Spare parts, estimated at 8 percent of purchase cost, is an expenditure that starts at \$29,661 in year one and grows in proportion to the installed base of servers.

TABLE 2: ANNUAL SERVER HARDWARE COSTS

ANNUAL SERVER HARDWARE COSTS	TCO ANALYSIS PERIOD			FORECAST PERIOD	
	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
Number of servers (beginning of year)	36	48	51	53	56
Servers added for growth	12	3	2	3	3
Servers purchased for replacement	0	0	36	12	3
Average purchase price per new server (initially)	\$7,813				
Average purchase price per growth or replacement server	\$0	\$17,047	\$17,047	\$17,047	\$17,047
Annual server purchase costs	\$93,759	\$51,141	\$647,792	\$255,707	\$102,283
Annual costs for server spare and replacement parts	\$29,661	\$31,144	\$32,701	\$34,336	\$36,053
Annual Server Hardware Costs (capex)	\$123,419	\$82,285	\$680,492	\$290,043	\$138,336
Annual Server Hardware	\$40,783	\$46,409	\$50,159	\$55,785	\$61,410
TOTAL SERVER HARDWARE COSTS	\$164,203	\$128,694	\$730,652	\$345,828	\$199,746

Capex for server hardware is \$123,419 in year one. Capex drops in year two but rises in year three to \$680,492 before it falls back again, as adding servers for growth and replacing aging servers continues to require a substantial and annually changing outlay.

Opex for server hardware is based primarily on server maintenance costs. Service contracts, typically priced at 11 percent of purchase price, generate an annual opex expenditure that starts at \$40,783 in year one and grows to \$61,410 in year five. The total cost of server hardware, including capex and opex, is \$1,023,549 for the three-year analysis period, and \$1,569,123 for the five-year forecast period.

Server software

To upgrade the performance and capacity of its legacy business applications, ABC Company must purchase additional server software, including multiple editions of Microsoft Windows Server 2016 Datacenter edition and SQL Server 2016 Enterprise edition. License counts and fees are detailed in the Server Software table in the appendix. Software, like hardware, is an asset.

Software must be booked on the corporate balance sheet as a capital expense and depreciated over time just like a server, storage and network equipment. Acquiring software for ABC’s technology upgrade will require a capex of \$461,840 in year one, as shown in Table 3. With a 5 percent annual growth rate in the server install base, software capex increases each year to total \$509,179 during the three-year analysis period, and \$561,369 for the five-year forecast period.

TABLE 3: ANNUAL SERVER SOFTWARE COSTS

ANNUAL SERVER SOFTWARE COSTS	TCO ANALYSIS PERIOD			FORECAST PERIOD	
	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
Annual server software purchase costs (capex)	\$461,840	\$23,092	\$24,247	\$25,459	\$26,732
Annual server software support costs (opex)	\$115,460	\$121,233	\$127,295	\$133,659	\$140,342
TOTAL SERVER SOFTWARE COSTS	\$577,300	\$144,325	\$151,541	\$159,118	\$167,074

Opex for server software includes ongoing support, which is standard for most enterprise software products. Calculated in this case at 25 percent of license fees, server support costs total \$115,460 in year one. With growth in the server install base, server software opex is \$363,988 for years one through three, and \$637,989 by the end of year five. The three-year TCO for server software, including capex and opex, is \$873,166. The five-year forecast is \$1,199,359.

Network infrastructure

The network infrastructure required to upgrade ABC Company’s legacy applications to support a growing base of internal and external end users must also be included in TCO. The network upgrade will involve the purchase of new equipment to replace outdated technology and enhance network security. Network security was an area of concern in the recent compliance audit, and ABC recognized that changes were necessary to fully comply with PCI DSS requirements.

From a TCO perspective, the network upgrade was treated like existing network infrastructure. Some companies may be tempted to think of the cost of the existing network as a “sunk cost” and to lump upgrades into that bucket. But that would be a mistake. The cost of upgraded network hardware, software, support and services must be applied to the TCO. This may appear to contradict what is generally known as a “sunk cost” in TCO theory, where if the assets in question have already been paid for, then the cost is “sunk” and not considered relevant to future investments. While there may be some merit to this argument, the best practice is to include the cost of any IT asset that is deployed in a project in the TCO calculations. For this TCO analysis, the cost of shared infrastructure assets that were in place or upgraded was applied proportionally to the TCO of the IT infrastructure upgrade project.

The specific equipment models and costs of the upgrade are detailed in the Network Infrastructure table in the appendix. The initial capex outlay for network equipment is \$855,988, as shown in Table 4. As the server workload and install base grow, additional network capex continues in each subsequent year, starting at \$42,799 in year two and growing to \$49,546 by year five. Network opex is based on ongoing maintenance costs and service contracts estimated at 8 percent of hardware purchase cost. Opex for network infrastructure grows from \$68,479 in year one to \$83,237 by year five. The three-year TCO for network infrastructure, including capex and opex, is \$1,159,607. The five-year forecast is \$1,418,849.

TABLE 4: ANNUAL SERVER SOFTWARE COSTS

ANNUAL NETWORK INFRASTRUCTURE COSTS	TCO ANALYSIS PERIOD			FORECAST PERIOD	
	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
Annual network equipment purchase costs (capex)	\$855,988	\$42,799	\$44,939	\$47,186	\$49,546
Annual network equipment maintenance costs (opex)	\$68,479	\$71,903	\$75,498	\$79,273	\$83,237
TOTAL SERVER SOFTWARE COSTS	\$924,467	\$114,702	\$120,438	\$126,459	\$132,782

Network bandwidth

ABC Company’s legacy business applications use a portion of the company’s existing network bandwidth, but the network must be upgraded to support growth and meet SLA requirements. Historically, ABC’s network relied on dedicated T-1 lines for all internet traffic. But the company moved away from T-1 provisioning in favor of a more flexible, broadband-based provisioning strategy with redundant gigabit fiber (FiOS) WAN link pairs through their ISP. This strategy offered the benefit of flexible scaling, lower cost and reduced complexity. The Network Bandwidth Costs table in the appendix shows that each server requires 56 Kbps of minimum continuous bandwidth and a maximum burst rate of 40 Mbps. At that rate, ABC must provide one redundant fiber WAN link to accommodate the current load and be prepared to add supplemental 250 Mbps bandwidth increments until year four, when it is certain that a supplemental increment will be required. This TCO calculation accounts for the worst-case scenario where bandwidth requirements increase rapidly at times and scale back at others, but headroom in network capacity prevented missed performance-based SLAs. At \$5,895 per month, the fiber WAN link adds an opex of \$70,740 in year one and grows proportionally over the next five years to \$103,570, as shown in Table 4B. The three-year TCO for network bandwidth is \$234,149. The five-year forecast is \$433,349.

TABLE 4B: ANNUAL NETWORK BANDWIDTH COSTS

NETWORK BANDWIDTH COSTS	TCO ANALYSIS PERIOD			FORECAST PERIOD	
	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
Number of WAN links required (1 Gbps Redundant, 2 Gbps total)	1.0	1.1	1.2	1.3	1.5
Number of WAN (250 Mbps) Bandwidth Increments Added	0.0	0.0	0.0	1.0	0.0
TOTAL ANNUAL NETWORK BANDWIDTH COSTS	\$70,740	\$77,814	\$85,595	\$95,629	\$103,570

Storage

Storage capacity for ABC Company’s legacy business applications must be upgraded as well. Based on requirements, ABC believes it will continue to benefit from the cost-performance characteristics of Dell EMC Unity 400 Hybrid Flash storage, configurable as dSAN or NAS. ABC needs roughly 388 TBs in year one to satisfy business requirements. The Storage table in the appendix contains the storage cost details. The interesting thing about storage TCO is that while company storage needs invariably rise over time, the cost per TB typically falls year by year.

ABC projects it will need 388 TBs in year one, 87,300 TBs more in year two, 106,943 TBs more in year three, and so forth. Storage costs are projected to decrease from about \$3 per GB in year one to just less than \$2 in year five – a 33 percent drop. With storage networking/interconnect costs calculated at 15 percent of storage hardware purchase price, storage capex is \$1,307,366 in year one. Year two will require supplemental storage purchases of \$250,034, and so forth for year three through year five. By the end of year five, total storage capex will be \$2,371,104. Storage opex, estimated as an 11 percent support fee for the storage hardware, grows from \$125,052 in year one to a total of \$874,405 by the end of year five. The three-year TCO for storage is \$2,265,640. The five-year forecast is \$3,245,599.

TABLE 5: ANNUAL STORAGE COSTS

ANNUAL STORAGE COSTS	TCO ANALYSIS PERIOD			FORECAST PERIOD	
	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
Storage capacity	0	388,000	475,300	582,243	713,247
Storage capacity added for growth (TBs)	388,000	87,300	106,943	131,005	160,481
Average price per GB	3	2	2	2	2
Annual storage purchase costs	1,136,840	217,421	226,389	235,728	245,452
Storage networking costs	170,526	32,613	33,958	35,359	36,818
Annual storage equipment costs (capex)	1,307,366	250,034	260,348	271,087	282,269
Annual storage support costs (opex)	\$125,052	\$148,969	\$173,871	\$199,802	\$226,801
TOTAL ANNUAL STORAGE COSTS	\$1,432,418	\$399,002	\$434,219	\$470,889	\$509,071

Backup infrastructure

Backup is another TCO element that often gets lumped into “sunk costs.” But this TCO analysis includes it for two reasons beyond the basic costs involved. One reason is that backup is a critical, repetitive process that requires FTEs who are included in the IT staff section of this TCO analysis. Another reason is that however routine backup might be, if not done correctly, it can be the source of missed SLAs and extremely costly incidents that may be visible outside the company, impacting brand reputation and profitability.

ABC Company performs local incremental backups of server data daily to ensure it has ready access to CRM and database archives if a restore were required to avoid missing a critical SLA. But it does not send a second copy of the tape media off-site to a remote location. Instead, ABC mirrors a snapshot of critical data to its DR service provider as part of its HA disaster recovery plan. The mirrored data,

supplemented by daily incremental backups taken by its DR service provider, forms ABC's recovery plan to satisfy recovery time and recovery point objectives.

Table 6 summarizes ABC Company's backup TCO. As detailed in the Backup table in the appendix, a single tape drive can accommodate five servers. With 62 servers installed by the end of year five, ABC will need 12 tape drives, each costing \$2,500. Each backup server requires its own software and its own support fees. Tape media alone totals up to \$11,669 by year five. The three-year TCO for backup is \$20,153. The five-year forecast is \$22,526.

TABLE 6: ANNUAL BACKUP COSTS

ANNUAL BACKUP COSTS	TCO ANALYSIS PERIOD			FORECAST PERIOD	
	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
Backup equipment costs (tape drives)	\$7,500	\$375	\$394	\$413	\$434
Backup software licenses	\$750	\$38	\$39	\$41	\$43
Annual backup software support costs	\$150	\$158	\$165	\$174	\$182
Annual tape media costs	\$9,600	\$480	\$504	\$529	\$556
TOTAL ANNUAL BACKUP INFRASTRUCTURE COSTS	\$18,000	\$1,050	\$1,103	\$1,158	\$1,216

Power and facilities

ABC Company legacy business applications have always been hosted in the company's own data center, a modern facility located in the metropolitan area of a major city in New York state. The data center requires electrical power to run and cool the hardware, power the lights, air conditioning, fire protection equipment, etc. ABC built the data center years ago and has continually maintained and enhanced it to be in like-new condition. Some assets are under current depreciation schedules, and some assets have been fully depreciated

with no residual value, but must not be treated as a sunk cost in TCO estimates. Instead, the total capex required to build and maintain the data center must be factored into TCO as a per-square-foot-of-floor-space cost based on the depreciation of all data center assets. Accordingly, this TCO analysis treats the data center as opex, even though its construction was capex at an earlier time.

If the data center becomes outdated, and a new data center is required to support future growth, then its cost would be treated as capex. But few companies today are building new data centers to handle growth because of the high cost involved. A 15,000-square-foot data center, which can hold about 460 equipment racks, will cost between \$8.2 and \$35 million for basic construction and infrastructure. This is one reason companies like ABC are moving to a managed hosting solution in the cloud from a service provider such as Rackspace. Rackspace Managed Hosting offers growth, scalability and opex budgeting while minimizing the need for large capex projects that weigh down profitability.

The Power and Facilities table in the appendix shows how ABC data center costs were determined. There are two basic cost factors: floor space and power. Floor-space costs were derived from a combination of building operating overhead and depreciation of facility construction costs. For instance, if a 15,000 square-foot data center costs \$10 million to build and was depreciated over 15 years (an industry norm), the depreciation charge for data center floor space would be \$44 per square foot per year. Data center floor space is \$62 per square foot per year and adds insurance, maintenance and fire protection to the total figure.

To determine how much floor space should be assigned to ABC Company's refreshed legacy applications, servers and network infrastructure, this analysis used floor space and cooling metrics. The analysis shows that the environment will grow from roughly 346 to 420 Us of rack space over five years. A U is 1.75" high, and most servers are one, two or four Us in height. There are 42 Us in a standard 19" wide data center rack. There are 40 usable Us per rack, and each rack requires about 20 square feet of floor space (including aisle ways, door swing space, etc.). Given the above, ABC legacy business applications, projected to use 420 Us by the end of year

five, will require 15 racks, for a total of 300 square feet of floor space. As Table 7 shows, this results in an annual floor space cost of \$8,005 in year one, growing to \$9,730 by the end of year five.

TABLE 7: ANNUAL DATA CENTER FACILITIES AND POWER COSTS

ANNUAL DATA CENTER FACILITIES COSTS	TCO ANALYSIS PERIOD			FORECAST PERIOD	
	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
Annual costs for data center floor space	\$8,005	\$8,405	\$8,825	\$9,267	\$9,730
Annual data center energy costs	\$180,999	\$190,049	\$199,551	\$209,529	\$220,005
Data center additional cost factor	2.2	2.2	2.2	2.2	2.2
ANNUAL DATA CENTER FACILITIES COSTS	\$415,808	\$436,599	\$458,429	\$481,350	\$505,418

Data center energy costs were estimated using two criteria. First is the power consumption required to run the equipment included in the project. Each piece of hardware uses power differently; for example, Dell PE R740xd (Xeon SP Dual) (2ch x 4co) - 768GB servers use about 495 watts of power on average, whereas the Dell PE R740xd (Xeon SP Dual) (2ch x 20co) - 384GB servers use about 1,600 watts of power. Over the course of five years, the servers, storage and network equipment used by ABC systems and legacy business applications need roughly 4,964,863 kilowatt-hours (kWh) of electricity.

Then there's the energy used to power the rest of the data center, including lighting, cooling and supplemental systems. The two figures are connected by a factor known as "Power Usage Effectiveness" or PUE, which is the ratio between system-specific energy use and general-purpose power use in a data center. The lower the PUE, the more energy efficient the data center is. In the most advanced data centers in the world, the PUE hovers around

1.2. This means that for every watt used to power an actual server, another 1.2 watts is required to cool the place down and keep the lights on. In this analysis, we assume a PUE of 2.5, which is standard in the industry.

Applying this PUE to the 4,964,863 kWh needed for the system hardware, overall power use on average will be just over 2 million kWh per year. At a cost of 9 cents per kWh, that comes to an average annual energy cost of \$200,027. The total data center facilities and power cost, after multiplying by Alinean’s add-on factor of 2.2 to account for corporate overhead and many other related expenses, averages \$459,521 per year of opex. The three-year TCO for data center facilities is \$1,310,836. The five-year forecast is \$2,297,604.

IT labor costs

Labor costs are the largest and a continually increasing opex category¹². This makes sense because IT is an inherently human activity, and it’s important to capture the full measure of IT staffing costs in TCO. Salaries and benefits are not the only cost items that must be included. This TCO analysis factors in training and turnover cost as well. Unlike equipment, people are not static. People change jobs. They learn new skills. They come on board, they leave for work elsewhere, etc. The cost of these activities must be modeled and analyzed for their impact on TCO.

One of the top benefits of migrating to a top-tier managed hosting provider like Rackspace is the ability to lower total staffing costs and increase specialized skills by leveraging the provider’s expert staff resources as part of a bundled service. The cost remains opex, but it is much lower than seeking and hiring comparable highly skilled technical people as direct employees. ABC Company, for example, faced significant security compliance challenges from its last audit, and hiring additional security staff plus a cyber-security manager to close the compliance gap was not an option. The IT labor costs shown in Table 9 are roughly 25 percent higher than ABC’s current labor costs because they include the expert IT security resources ABC would need to become fully compliant with PCI DSS.

SYSTEM ADMINISTRATION STAFF

Each technology and security component of ABC Company’s legacy business applications must be monitored and managed at least part of the time. A person with many duties may split his or her time between tasks to balance the workload. But for other parts of the technical environment, one or more full-time people may be required to keep things running smoothly. The TCO analysis for system administration and security staff is detailed in the System Admin Labor appendix. It details how many full-time employees (FTEs) will be needed to oversee the servers, network, databases, storage, security and so forth. A person who only spends part of his or her time on a component is estimated as a fraction of an FTE. For instance, if a server administrator spends one quarter of his or her time working on the web servers, the TCO analysis counts that as 0.25 FTE.

TABLE 8: ANNUAL IT LABOR COSTS

IT LABOR COSTS	TCO ANALYSIS PERIOD			FORECAST PERIOD	
	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
Average fully burdened salary	\$123,505	\$154,382	\$192,977	\$241,221	\$301,526
System administration efforts (hours)	21,510	22,048	22,599	23,164	23,743
System admin staff (FTEs)	11.95	12.25	12.55	12.87	13.19
SYSTEM ADMINISTRATION EFFORTS (HOURS)	\$1,475,888	\$1,571,820	\$1,673,988	\$1,782,798	\$1,898,680

System administrators and security analysts earn different salaries. In this analysis, we estimate a server administrator earns an average salary of \$85,000 a year, while a database administrator earns \$95,000 and a Level 2 security analyst may earn \$95,000 a year. These figures are based on standard industry salaries from Alinean TCO reference sources. With taxes and benefits, the “fully burdened” salary across all types of system administrators and security analysts averages \$92,222 per year.

As shown in Table 8, 11.95 FTEs are required to support the systems, applications, network, databases and security of ABC’s IT environment if it chooses to expand in-house staff resources rather than leverage the expertise of a managed hosting provider such as Rackspace. Year one total labor costs will be \$1,475,888. The three-year TCO of IT labor is \$4,721,696. The five-year forecast is \$8,403,174.

TRAINING

This TCO analysis assumed that IT server, network and database administrators receive either 40 or 80 training hours per year, and security administrators receive as much as 160 hours of training per year, as detailed in the IT Training Costs appendix. At an average rate of \$3,500 per 40-hour training unit, the IT server, storage, database, network and security staff required to run ABC’s legacy business applications will accrue training costs of roughly \$124,950 in year one, and that cost will rise 2.5 percent in years two and three, to a total of \$384,299. The five-year forecast is \$656,778. Table 9 below summarizes the costs and hours involved.

TABLE 9: ANNUAL IT TRAINING COSTS

TRAINING	TCO ANALYSIS PERIOD			FORECAST PERIOD	
	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
IT training costs	\$124,950	\$128,074	\$131,276	\$134,557	\$137,921
IT training hours	1,428	1,464	1,500	1,538	1,576

STAFF TURNOVER

IT staff turnover is estimated at 3 percent per year, which means that ABC Company will be replacing 0.36 FTE per year. ABC has historically benefited from a low turnover rate, as comparable companies in the financial industry experience an annual IT staff turnover rate between 3.5 percent and 5 percent. ABC recruitment costs per new IT staff position are estimated at 20 percent of the fully burdened salary, or \$24,701 per year. Adding in onboarding costs equivalent to five weeks’ salary, the total cost of IT staff turnover averages \$13,113 per year. The three-year TCO of staff

turnover is \$40,330. The five-year forecast is \$68,925. A detailed look at these costs is shown in the appendix and in Table 10.

TABLE 10: ANNUAL IT STAFF TURNOVER COSTS

TURNOVER	TCO ANALYSIS PERIOD			FORECAST PERIOD	
	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
IT staff turnover costs	\$13,113	\$13,441	\$13,777	\$14,121	\$14,474

Indirect costs

Accurate TCO must include an estimate of the indirect costs required to host ABC Company's legacy business applications on-premises, as compared to a managed hosting environment.

Indirect costs represent an expense of doing business that cannot be easily assigned to a specific project, department or cost object, but which is necessary for the general operation of the business and the conduct of activities it performs. Indirect costs include unplanned downtime, planned downtime and business agility, among others. Each of these indirect cost categories has a real impact on ABC's financial picture, even if they can be somewhat challenging to measure.

Indirect cost estimation tends to be more subjective and assumption-based than the clear-cut dollars and cents of hardware, software and network TCO elements. However, the Alinean TCO model, which is based on years of experience in cost analysis, shows that managed hosting delivers significantly better indirect cost performance than on-premises hosting, as detailed in the Indirect Cost table in the appendix and summarized in Table 11. For this analysis, managed hosting indirect costs are only 28 percent of on-premises hosting indirect costs. That's an average benefit of \$141,767 per year. The three-year TCO of indirect costs is \$385,313. The five-year forecast is \$708,835.

TABLE 11: INDIRECT BUSINESS COSTS

INDIRECT BUSINESS COSTS	TCO ANALYSIS PERIOD			FORECAST PERIOD	
	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
CURRENT SELF-MANAGED COSTS					
Unplanned downtime - productivity impact	\$73,425	\$80,768	\$88,845	\$97,730	\$107,503
Planned downtime - productivity impact	\$40,050	\$42,053	\$44,156	\$46,364	\$48,682
Business agility - productivity impact	\$267,123	\$293,835	\$323,219	\$355,541	\$391,095
Unplanned downtime - business costs (revenue opportunity cost)	\$48,400	\$53,240	\$58,564	\$64,420	\$70,862
Planned downtime - business costs (revenue opportunity cost)	\$316,800	\$348,480	\$383,328	\$421,661	\$463,827
Business agility - revenue impact (lost revenue opportunity)	\$58,767	\$64,644	\$71,108	\$78,219	\$86,041
TOTAL SELF-MANAGED COSTS	\$804,565	\$883,020	\$969,220	\$1,063,935	\$1,168,010
Indirect benefit realization factor	20%	20%	20%	20%	20%
TOTAL REALIZED COSTS	\$160,913	\$176,604	\$193,844	\$212,787	\$233,602
COSTS WITH HOSTED SOLUTION					
Unplanned downtime - productivity impact	\$14,636	\$16,100	\$17,710	\$19,481	\$21,429
Planned downtime - productivity impact	\$8,010	\$8,411	\$8,832	\$9,274	\$9,738

TABLE 11: INDIRECT BUSINESS COSTS (CONT.)

INDIRECT BUSINESS COSTS	TCO ANALYSIS PERIOD			FORECAST PERIOD	
	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
COSTS WITH HOSTED SOLUTION CONT.					
Business agility - productivity impact	\$102,741	\$113,015	\$124,317	\$136,749	\$150,424
Unplanned downtime - business costs (Revenue opportunity cost)	\$9,647	\$10,612	\$11,673	\$12,840	\$14,124
Planned downtime - business costs (revenue opportunity cost)	\$63,360	\$69,696	\$76,666	\$84,333	\$92,766
Business agility - revenue impact (revenue opportunity cost)	\$22,603	\$24,863	\$27,349	\$30,084	\$33,092
TOTAL HOSTED COSTS	\$220,997	\$242,697	\$266,547	\$292,761	\$321,573
Indirect benefit realization factor	20%	20%	20%	20%	20%
TOTAL REALIZED COSTS	\$44,199	\$48,539	\$53,309	\$58,552	\$64,315
TOTAL IMPROVED SERVICE LEVEL AND RISK REDUCTION BENEFITS*	\$116,714	\$128,065	\$140,535	\$154,235	\$169,287

* Includes improved security realization benefits provided by Rackspace RMS

For example, the financial impact of planned and unplanned downtime is estimated by calculating the number of worker hours that are lost to system outages. Managed hosting solutions typically have a higher rate of uptime and less planned downtime; as a result, they reduce the impact of downtime on productivity. Managed hosting solutions also speed up planned downtime cycles, which reduces the revenue opportunity cost associated with having systems offline. ABC will benefit from improved service levels and the extremely high availability of a managed hosting solution from

Rackspace, which will mitigate the risk of missing a committed SLA on one of its legacy applications.

Business agility is another example. This analysis measures business agility by the rate at which the company can develop and deploy upgraded and/or new applications to drive competitiveness and differentiation. The faster the applications are put into production and contribute to revenue growth, the more financial benefit the company will gain. A revenue-enhancing application whose deployment is delayed results in an opportunity cost of lost revenue. In this case, as shown in the Business Agility table in the appendix, the ability to provision applications in 25 days instead of 65 reduces the average lost productivity improvement value per system from \$89,041 to \$34,247 and the annual value of productivity losses from \$267,123 to \$102,741. We'll talk more about agility using time-to-market as an example in the "Migrate or Not?" section.

Finally, ABC Company will benefit from the improved security levels provided by Rackspace Managed Security, which not only closes the security gap that was identified in the company's last compliance audit, but also helps to refine its security strategy by making it more effective against cyber attacks, improving monitoring and detection, and implementing around-the-clock rapid response and remediation.

ESTIMATING THE TCO DIFFERENTIAL OF MIGRATING

The TCO of migrating to a managed hosting solution will vary from company to company based on business requirements and on the cloud services companies require to drive flexibility, scalability and growth. For ABC Company, this TCO analysis strongly supported the decision to move legacy business applications to a Rackspace Managed Hosting solution rather than building out internal infrastructure and adding staff to keep these applications in-house. The Alinean TCO model,¹¹ guided by experience with clients of all sizes and industries, shows that most companies have a potential capex plus opex savings between 55 percent and 75 percent of the cost of on-premises hosting. ABC Company achieved a 65 percent TCO savings. Table 12 summarizes the three-year analysis (plus year

four and five forecasts) for on-premises upgrade and support of its legacy business applications versus a managed hosting solution from Rackspace and shows how ABC Company compared to the expected range of savings.

TABLE 12: TOTAL CAPEX/OPEX OF IN-HOUSE VS. HOSTED INFRASTRUCTURE

COST COMPARISON	TCO ANALYSIS PERIOD			FORECAST PERIOD	
	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
In-house	\$5,216,887	\$3,015,521	\$3,801,017	\$3,806,787	\$3,669,952
TOTAL	\$19,458,452				
Hosted (Low Estimate from Alinean model)	\$1,386,000	\$1,455,300	\$1,528,065	\$1,604,468	\$1,684,692
TOTAL	\$7,658,525				
Hosted (Actual)	\$1,800,000	\$1,890,000	\$1,984,500	\$2,083,725	\$2,187,911
TOTAL	\$9,946,136				
Hosted (High Estimate from Alinean model)	\$2,214,000	\$2,324,700	\$2,440,935	\$2,562,982	\$2,691,131
TOTAL	\$12,233,748				

For ABC Company, as shown in Table 13, migrating to a managed hosting solution from Rackspace was estimated to save roughly \$6.3 million over the three-year analysis period and \$9.5 million over the five-year forecast period. A comparison of indirect business costs would also favor managed hosting due to administration and staffing efficiencies at the hosting provider's site. The annual opex outlay will also be lower with managed hosting, and ABC will save more than \$2.7 million in capex in year one alone.

TABLE 13: IN-HOUSE VS. HOSTED FINANCIAL COMPARISON

FINANCIAL COMPARISON	THREE YEARS		FIVE YEARS	
	ON-PREMISES	HOSTED	ON-PREMISES	HOSTED
Capex	\$4,177,002		\$5,310,033	
Opex	\$7,856,423	\$5,674,500	\$14,200,131	\$9,946,136
TOTAL	\$12,033,425	\$5,674,500	\$19,510,164	\$9,946,136
Savings from hosting	\$6,358,925		\$9,564,027	
YEAR 1 CAPEX SAVINGS	\$2,766,613			

MIGRATE TO MANAGED HOSTING, OR NOT?

This analysis indicates that the TCO of a managed hosting solution from a top-tier cloud provider such as Rackspace is lower than the TCO of on-premises hosting; and for some companies like ABC Company, the TCO is significantly lower over three to five years. That is a strong argument in favor of managing hosting from a profitability perspective. But the decision to migrate to a managed hosting solution must account for many distinct factors that affect how a company operates today and how it will operate tomorrow with part or all of its infrastructure and applications running in the cloud. In practical terms, most workloads migrate and perform very well in the cloud; but some workloads can be challenging to migrate if they are custom-written applications based on non-standard interfaces and platforms. This was the case with ABC Company, which had a significant investment of time, money and business processes dependent on how a group of legacy applications perform today and must perform tomorrow to meet business requirements. ABC determined that it would be nearly impossible to upgrade or move these core legacy applications in a manner that leverages most cloud platforms without a significant investment in refactoring and retooling their applications. Since ABC would need to keep

its legacy applications running indefinitely, the IT team decided managed hosting would be the right path to the cloud for their legacy applications. With managed hosting, ABC would get the benefits of the cloud without having to refactor and retool its legacy applications to use cloud architecture.

As ABC Company demonstrated, it's a good idea to start small with one cloud hosting candidate and then migrate more workloads as the IT staff becomes more familiar with the process, even if the application(s) are based on legacy architectures. At the end of this white paper are links to several references that provide guidance on choosing workloads to migrate.

Financially, ABC's total savings on capex and opex is a compelling argument in favor of a managed hosting solution from Rackspace migration. Savings of \$6.3 million over three years (and \$9.5 million over five years) are significant and will be meaningful to the people responsible for managing ABC's assets on behalf of its shareholders. That's an average of \$2.8 million per year that could be used for other business investment purposes. There's also a risk reduction benefit to offloading capex to a third party. Not only is there high opportunity cost to make heavy capital investments on infrastructure, but the risks associated with managing those purchases are high as well. If the new IT infrastructure does not deliver the desired business benefits, the capital will have been wasted or put to suboptimal use. These kinds of problems show up indirectly in financial results and share prices.

Another way to look at the benefit of capex savings is to estimate the cost of capital. Most financial executives evaluate capital expense based on a "cost of equity capital" criteria to determine if an investment is worth making. Cost of capital varies by industry, but the weighted average cost of capital (WACC), according to the accounting firm KPMG, is 7.1 percent. That means that most companies assume that all capex is costing 7.1 percent a year as if they were paying interest on a loan¹³. For ABC, the five-year \$5.2 million capex savings will accrue a capital cost charge of \$374,909 on top of the other costs. The cost of capital charge further widens the gap between on-premises and hosted infrastructure. If ABC must borrow money to invest in the project, it would probably use a cost

of debt of 3.4 percent, which is the current average of high-grade corporate bonds. At that rate, the refresh project will need to tack about \$179,534 a year onto the TCO for interest expense.

Finally, it's worth pointing out the many intangible benefits that arise from migrating to a managed hosting environment. These intangibles are difficult to quantify in dollar terms, but they are meaningful to the business. Time-to-market is an example of a subjective, intangible benefit of hosted environments. The ability to flexibly and rapidly provision IT systems that support growth initiatives can bring strong strategic and financial rewards to a business.

The "asset value" of IT staff is also an intangible aspect of hosted cloud environments. While staffing is opex, it is a useful exercise to think about IT staff as an asset to the business. This goes beyond HR talk about "people are an asset" and so forth; it's about understanding that IT salaries and skills training is an investment in the business. Like any investment, they can be analyzed for their rates of return. It's critical to ask, what is the investment in IT salaries and training yielding for the business? Is the investment being used to "keep the lights on," as is the case with many IT departments? Or is the investment yielding valuable, strategic returns for the business?

Capacity planning is another important intangible factor to assess when making the managed hosting migration decision. In today's IT world, where new form factors, such as tablets and mobile devices, can cause rapid and unpredictable growth in compute demand, the ability to host capacity in the cloud takes a lot of pressure off IT capacity planners. If your data center is already reaching capacity, it can be a major challenge to figure out how much new on-premises capacity you will need over the next few years. And given the high costs of data center construction, having a managed hosting environment can be a big advantage.

CONCLUSION

IT managers are entrusted with the IT department's portion of the total annual corporate budget. Regarding capex expenditures, shareholders want to know, "Is purchasing this IT infrastructure

asset the best possible use of the company's money now?" Or could it be better invested in other strategic assets, such as a research laboratory or a new manufacturing plant? Shareholders also look closely at opex because a dollar saved in opex is worth many times that amount in the company's market valuation. For example, if a company's stock is trading at 10 times earnings, then a dollar saved on opex is worth nearly \$10 in value to shareholders. This formula applies to both public and private companies. The net of this thinking is that TCO, ROI and other financial metrics that estimate costs, revenue and profitability must be based on hard numbers and a proven analysis process to be credible.

The decision to migrate legacy applications and on-premises infrastructure to a managed hosting environment can be complex and challenging, as the ABC Company example illustrates. However, it can be a clear and informative process if approached from a TCO perspective using solid data. An accurate TCO analysis based on sound financial principles can help companies like ABC make a managed hosting decision using numbers that are accurate and relevant to their specific scenario – inclusive of their requirements, objectives, regulatory environment and risk profile. This white paper described in detail how the Alinean TCO methodology¹¹ was applied to help ABC make their managed hosting decision by gaining a thorough understanding of the actual cost of upgrading on-premises infrastructure and adding IT staff and comparing it to managed hosting costs.

For ABC Company, the decision to migrate its legacy applications to a managed hosting solution from Rackspace was the right one. The challenges it faced were not unique. According to Ernst and Young, 85% of banks cite digital transformation as a priority this year and six in ten expect to be digitally mature by 2020¹⁵. The high cost of funding in-house projects for these types of initiatives was a top reason ABC Company chose Rackspace to help move its legacy applications to the cloud. The TCO analysis showed that ABC Company would save roughly \$6.3 million over the three-year analysis period, and \$9.5 million over the five-year forecast period by migrating to managed hosting from Rackspace.

APPENDICES

Direct business costs breakout

SERVER HARDWARE

SERVER HARDWARE	UNITS	AVERAGE COST PER SERVER	TOTAL NEW SERVER PURCHASE COSTS	ANNUAL HARDWARE MAINTENANCE	HARDWARE MAINTENANCE AS % OF COSTS
Dell PE R740xd (Xeon SP Dual) (2ch x 16co) - 384GB	5	\$7,600	\$38,000	\$4,180	11%
Dell PE R740xd (Xeon SP Dual) (2ch x 16co) - 384GB	5	\$7,600	\$38,000	\$4,180	11%
Dell PE R740xd (Xeon SP Dual) (2ch x 20co) - 384GB	5	\$10,500	\$52,500	\$5,775	11%
Dell PE R740xd (Xeon SP Dual) (2ch x 20co) - 384GB	5	\$10,500	\$52,500	\$5,775	11%
Dell PE R740xd (Xeon SP Dual) (2ch x 4co) - 768GB	2	\$4,500	\$9,000	\$990	11%
Dell PE R740xd (Xeon SP Dual) (2ch x 4co) - 768GB	2	\$4,500	\$9,000	\$990	11%
Dell PE R740xd (Xeon SP Dual) (2ch x 8co) - 196GB	12	\$6,500	\$78,000	\$8,580	11%
TOTAL NEW SERVER PURCHASE COSTS AND ANNUAL MAINTENANCE	36	\$7,694	\$277,000	\$30,470	

1. Average annual costs for server spare and replacement parts \$29,661, 5% of the total purchase
2. Average annual growth in server requirements 5.0%
3. Average annual growth in server purchase costs 5.0%
4. Average server refresh period 36 months

SERVER HARDWARE ANNUAL COSTS	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
Number of servers (beginning of year)	36	48	51	53	56
Servers added for growth	12	3	2	3	3
Servers purchased for replacement	0	0	36	12	3
Average purchase price per new server (initially)	\$7,813	\$0	\$0	\$0	\$0
Average purchase price per growth or replacement server	\$0	\$17,047	\$17,047	\$17,047	\$17,047
Annual server purchase costs	\$93,759	\$51,141	\$647,792	\$255,707	\$102,283
Annual costs for server spare and replacement parts	\$29,661	\$31,144	\$32,701	\$34,336	\$36,053
Annual server hardware costs (capex)	\$123,419	\$82,285	\$680,492	\$290,043	\$138,336
Annual server hardware maintenance (opex)	\$40,783	\$46,409	\$50,159	\$55,785	\$61,410
TOTAL SERVER HARDWARE COSTS	\$164,203	\$128,694	\$730,652	\$345,828	\$199,746

SERVER SOFTWARE

SERVER SOFTWARE	SERVERS	LICENSES	COST PER LICENSE	TOTAL LICENSE COSTS	ANNUAL SUPPORT
OPERATING SYSTEM					
Windows Server 2016 Datacenter Edition	36	72	\$2,999	\$215,928	\$53,982
VIRTUALIZATION SOFTWARE					
Hyper-V Container Isolation (Unlimited)	Included	Included	Included	Included	Included
Host Guardian Services	Included	Included	Included	Included	Included
DATABASE					
SQL Server 2016 Enterprise	4	8	\$30,739	\$245,912	\$61,478
TOTAL SERVER SOFTWARE COSTS				\$461,840	\$115,460

SERVER SOFTWARE ANNUAL COSTS	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
Annual server software purchase costs (capex)	\$461,840	\$23,092	\$24,247	\$25,459	\$26,732
Annual server software support costs (opex)	\$115,460	\$121,233	\$127,295	\$133,659	\$140,342
TOTAL SERVER SOFTWARE COSTS	\$577,300	\$144,325	\$151,541	\$159,118	\$167,074

1. Average annual growth rate in server requirements 5.0%

NETWORK INFRASTRUCTURE

NETWORK AND SECURITY	QUANTITY	AVERAGE COST PER DEVICE	TOTAL PURCHASE COSTS	ANNUAL HARDWARE MAINTENANCE
NETWORK AND SECURITY HARDWARE				
Cisco ASA 5525-X	2	\$6,414	\$12,828	\$1,026
Imperva WAF (x4510, 1 Gbps)	2	\$127,170	\$254,340	\$20,347
F5 BIG-IP 5200 (HA) with LTM + AFM	2	\$113,546	\$227,092	\$18,167
Cisco ASR1001-X - HA	4	\$12,188	\$48,752	\$3,900
Cisco 9372-TX - HA	6	\$22,455	\$134,730	\$10,778
Cisco 9372-PX - HA	2	\$22,805	\$45,610	\$3,649
Brocade DS-6520B 48 ports	2	\$62,456	\$124,912	\$9,993
TOTAL INFRASTRUCTURE COSTS	20		\$855,988	\$68,479

NETWORK AND SECURITY ANNUAL COSTS	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
Annual network infrastructure purchase costs (capex)	\$855,988	\$42,799	\$44,939	\$47,186	\$49,546
Annual network infrastructure maintenance costs (opex)	\$68,479	\$71,903	\$75,498	\$79,273	\$83,237
TOTAL NETWORK INFRASTRUCTURE COSTS	\$924,467	\$114,702	\$120,438	\$126,459	\$132,782

1. Average annual growth in server requirements 5.0%

NETWORK BANDWIDTH

BROADBAND BANDWIDTH ANALYSIS	WAN BROADBAND
Available bandwidth per WAN (1 Gbps) (Redundant Pair)	2,000
Average cost per month per WAN (1 Gbps) (Redundant Pair)	\$5,895
Number of connected servers	36
Minimum continuous bandwidth per server (Kbps)	56
Maximum continuous bandwidth per server (Mbps)	40
Number of WAN (1 Gbps) (Redundant Pair) lines required (year one)	1.0
Annual network bandwidth costs (year one)	\$70,740
Average annual growth rate in network requirements	5.0%

NETWORK BANDWIDTH ANNUAL COSTS	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
Number of WAN links required (1 Gbps Redundant, 2 Gbps total)	1.0	1.1	1.2	1.3	1.5
Number of WAN (250 Mbps) Bandwidth Increments Added	0.0	0.0	0.0	1.0	0.0
TOTAL ANNUAL NETWORK BANDWIDTH COSTS	\$70,740	\$77,814	\$85,595	\$95,629	\$103,570

1. Average annual growth in server requirements 5.0%

STORAGE

STORAGE	CAPACITY (GB)	AVERAGE COST PER GB	TOTAL STORAGE PURCHASE COSTS	ANNUAL SUPPORT
Dell EMC Unity 400 Hybrid Flash (dSAN)	388,000	\$2.93	\$1,136,840	\$125,052
TOTAL	388,000	\$2.93	\$1,136,840	\$125,052

STORAGE INFRASTRUCTURE ANNUAL COSTS	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
Storage capacity (GBs at beginning of year)	0	388,000	475,300	582,243	713,247
Storage capacity added for growth (GBs)	388,000	87,300	106,943	131,005	160,481
Average price per GB	\$3	\$2	\$2	\$2	\$2
Annual storage purchase costs	\$1,136,840	\$217,421	\$226,389	\$235,728	\$245,452
Storage networking costs	\$170,526	\$32,613	\$33,958	\$35,359	\$36,818
Annual storage equipment costs (capex)	\$1,307,366	\$250,034	\$260,348	\$271,087	\$282,269
Annual storage support costs (opex)	\$125,052	\$148,969	\$173,871	\$199,802	\$226,801
TOTAL ANNUAL STORAGE COSTS	\$1,432,418	\$399,002	\$434,219	\$470,889	\$509,071

1. Average annual decrease in price per TB of storage 15.0%
 2. Average annual growth in storage capacity 22.5%

LOCAL BACKUP TO SUPPORT RP/RT OBJECTIVE IN SLAS

LOCAL BACKUP (TO SUPPORT RP/RT IN SLAS)	
Total number of local backup servers	12
Average number of servers per backup tape drive	5
Average purchase price per tape drive	\$2,500
Purchase costs for tape drives	\$7,500
Average backup software cost per server	\$250
Backup software license costs	\$750
Backup software support	1000% per year
Average number of tapes per server	10
Average cost per tape	\$80
Tape media costs	\$9,600
Is off-site tape storage required?	No
Number of tapes stored off-site	24 2 per server
Annual costs for off-site tape storage	\$3,600 at \$150 per tape
Average annual growth in server requirements	5.0%

LOCAL BACKUP ANNUAL COSTS	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
Backup equipment costs (tape drives)	\$7,500	\$375	\$394	\$413	\$434
Backup software licenses	\$750	\$38	\$39	\$41	\$43
Annual backup software support costs	\$150	\$158	\$165	\$174	\$182
Annual tape media costs	\$9,600	\$480	\$504	\$529	\$556
Annual off-site tape storage costs	\$0	\$0	\$0	\$0	\$0
TOTAL ANNUAL BACKUP INFRASTRUCTURE COSTS	\$18,000	\$1,050	\$1,103	\$1,158	\$1,216

1. Average annual growth in server requirements 5.0%

POWER AND FACILITIES

DEVICE TYPE	NUMBER OF DEVICES	AVERAGE RACK SPACE	TOTAL RACK SPACE	AVERAGE POWER (WATTS)	TOTAL POWER (WATTS)
SERVERS					
Dell PE R740xd (Xeon SP Dual) (2ch x 16co) - 384GB	5	2	10	1,100	5,500
Dell PE R740xd (Xeon SP Dual) (2ch x 16co) - 384GB	5	2	10	1,100	5,500
Dell PE R740xd (Xeon SP Dual) (2ch x 20co) - 384GB	5	2	10	1,600	8,000
Dell PE R740xd (Xeon SP Dual) (2ch x 20co) - 384GB	5	2	10	1,600	8,000
Dell PE R740xd (Xeon SP Dual) (2ch x 4co) - 768GB	2	2	4	495	990
Dell PE R740xd (Xeon SP Dual) (2ch x 4co) - 768GB	2	2	4	495	990
Dell PE R740xd (Xeon SP Dual) (2ch x 8co) - 196GB	12	2	24	750	9,000
NETWORK					
Cisco ASA 5525-X	2	1	2	350	700
Imperva WAF (x4510, 1 Gbps)	2	2	4	748	1,496
F5 BIG-IP 5200 (HA) with LTM + AFM	2	1	2	1,125	2,250
Cisco ASR1001-X - HA	4	1	4	245	980
Cisco 9372-TX - HA	6	1	6	426	2,556
Cisco 9372-PX - HA	2	1	2	452	904
Brocade DS-6520B 48 ports	2	1	2	385	770
STORAGE DEVICES					
Dell EMC Unity 400 Hybrid Flash (dSAN)	127	2	254	432	54,864
TOTAL	183	2	348	560	102,500

1. Average annual growth in server requirements 5.0%

2. 40 U's of usable rack space per rack

3. 20 Sq. feet of floor space per rack

POWER AND FACILITIES CONTINUED

POWER AND FACILITIES ANNUAL COSTS	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
DATA CENTER FLOOR SPACE COSTS					
Data center requirements (Us)	348.0	365.4	383.7	402.9	423.0
Square feet of data center floor space	138.0	144.9	152.2	159.8	167.8
Average annual cost per square foot of floor space	\$58.00	\$58.00	\$58.00	\$58.00	\$58.00
ANNUAL COSTS FOR DATA CENTER FLOOR SPACE	\$8,005	\$8,405	\$8,825	\$9,267	\$9,730
DATA CENTER POWER AND COOLING COSTS					
Average power consumption per hour	102,500	107,625	113,006	118,657	124,589
Operating hours per year	8,766	8,766	8,766	8,766	8,766
Annual power consumption (kWatts)	898,515	943,441	990,613	1,040,143	1,092,151
Data center PUE factor	2	2	2	2	2
TOTAL ANNUAL DATA CENTER POWER AND COOLING (KWATTS)	1,831,972	1,923,571	2,019,749	2,120,737	2,226,774
Average cost per kWatt/hour	\$0.10	\$0.10	\$0.10	\$0.10	\$0.10
Annual data center energy costs	\$180,999	\$190,049	\$199,551	\$209,529	\$220,005
Data center addition cost factor	2.2	2.2	2.2	2.2	2.2
ANNUAL DATA CENTER FACILITIES COSTS	\$415,808	\$436,599	\$458,429	\$481,350	\$505,418

SYSTEM ADMINISTRATION LABOR

SYSTEMS ADMINISTRATION LABOR	NUMBER OF STAFF FTES	AVERAGE ANNUAL SALARY	FULLY-BURDENED COST PER FTE	TOTAL ANNUAL COSTS (YEAR 1)
Server Administrators	3.00	\$85,000	\$114,750	\$344,250
Network and Security Administrators	1.00	\$85,000	\$114,750	\$114,750
Database Administrators	1.50	\$95,000	\$128,250	\$192,375
Storage Administrators	1.25	\$75,000	\$101,250	\$126,563
Backup Administrators	0.20	\$60,000	\$81,000	\$16,200
Security Analyst I	2.00	\$75,000	\$101,250	\$202,500
Security Analyst II	1.00	\$95,000	\$128,250	\$128,250
Security Analyst II	1.00	\$115,000	\$155,250	\$155,250
Cyber Security Manager	1.00	\$145,000	\$195,750	\$195,750
TOTAL	11.95	\$91,485	\$123,505	\$1,475,888

1. Average annual increase in system admin effort 2.5%
2. Average annual increase in system admin salaries 4.0%
3. Hours worked per year 1,800

POWER AND FACILITIES ANNUAL COSTS	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
Average fully burdened salary	\$123,505	\$154,382	\$192,977	\$241,221	\$301,526
System admin labor costs	\$1,475,888	\$1,571,820	\$1,673,988	\$1,782,798	\$1,898,680
System admin staff (FTEs)	11.95	12.25	12.55	12.87	13.19
SYSTEM ADMINISTRATION EFFORTS (HOURS)	21,510	22,048	22,599	23,164	23,743

IT TRAINING COSTS

SYSTEMS ADMINISTRATION TRAINING	NUMBER OF STAFF FTES	AVERAGE HOURS OF TRAINING PER YEAR	AVERAGE ANNUAL COURSE FEES AND EXPENSES	TOTAL ANNUAL COSTS (YEAR 1)
Server Administrators	3.00	80.00	\$7,000	\$21,000
Network and Security Admins	1.00	160.00	\$14,000	\$14,000
Database Administrators	1.50	80.00	\$7,000	\$10,500
Storage Administrators	1.25	80.00	\$7,000	\$8,750
Backup Administrators	0.20	40.00	\$3,500	\$700
Security Analyst I	2.00	160.00	\$14,000	\$28,000
Security Analyst II	1.00	160.00	\$14,000	\$14,000
Security Analyst II	1.00	160.00	\$14,000	\$14,000
Cyber Security Manager	1.00	160.00	\$14,000	\$14,000
TOTAL	11.95	1,428	\$124,950	\$124,950

SYSTEMS ADMINISTRATION TRAINING ANNUAL COSTS	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
IT training costs	\$124,950	\$128,074	\$131,276	\$134,557	\$137,921
IT training hours	1,428	1,464	1,500	1,538	1,576

1. Average annual increase in system administration effort 2.5%

IT STAFF TURNOVER COSTS

IT STAFF TURNOVER		
Number of IT systems admin staff	11.95	
Average annual turnover rate for IT staff	3%	
Number of new IT staff per year	0.36	
Average annual fully burdened salary	\$123,505	
Average recruitment cost per position	\$24,701	20%
Average on-boarding period for IT staff	5.0	weeks
Onboarding costs	\$11,876	
Total annual IT staff turnover costs (year one)	\$13,113	

IT STAFF TURNOVER ANNUAL COSTS	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
IT staff turnover costs	\$13,113	\$13,441	\$13,777	\$14,121	\$14,474

Indirect business costs breakout

INDIRECT BUSINESS COST SUMMARY

INDIRECT BUSINESS ANNUAL COSTS	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
CURRENT SELF-MANAGED COSTS					
Unplanned downtime - productivity impact	\$73,425	\$80,768	\$88,845	\$97,730	\$107,503
Planned downtime - productivity impact	\$40,050	\$42,053	\$44,156	\$46,364	\$48,682
Business agility - productivity impact	\$267,123	\$293,835	\$323,219	\$355,541	\$391,095
Unplanned downtime -business costs	\$48,400	\$53,240	\$58,564	\$64,420	\$70,862
Planned downtime - business costs	\$316,800	\$348,480	\$383,328	\$421,661	\$463,827
Business agility - revenue impact	\$58,767	\$64,644	\$71,108	\$78,219	\$86,041
TOTAL SELF-MANAGED COSTS	\$804,565	\$883,020	\$969,220	\$1,063,935	\$1,168,010
Indirect benefit realization factor	20%	20%	20%	20%	20%
TOTAL REALIZED COSTS	\$160,913	\$176,604	\$193,844	\$212,787	\$233,602
COSTS WITH HOSTED SOLUTION					
Unplanned downtime - productivity impact	\$14,636	\$16,100	\$17,710	\$19,481	\$21,429
Planned downtime - productivity impact	\$8,010	\$8,411	\$8,832	\$9,274	\$9,738
Business agility - productivity impact	\$102,741	\$113,015	\$124,317	\$136,749	\$150,424
Unplanned downtime - business costs	\$9,647	\$10,612	\$11,673	\$12,840	\$14,124
Planned downtime - business costs	\$63,360	\$69,696	\$76,666	\$84,333	\$92,766
Business agility - revenue Impact	\$22,603	\$24,863	\$27,349	\$30,084	\$33,092
TOTAL HOSTED COSTS	\$220,997	\$242,697	\$266,547	\$292,761	\$321,573
Indirect benefit realization factor	20%	20%	20%	20%	20%
TOTAL REALIZED COSTS	\$44,199	\$48,539	\$53,309	\$58,552	\$64,315
TOTAL IMPROVED SERVICE LEVEL BENEFITS	\$116,714	\$128,065	\$140,535	\$154,235	\$169,287

UNPLANNED DOWNTIME - PRODUCTIVITY IMPACT

UNPLANNED DOWNTIME	SELF-MANAGED ENVIRONMENT	EXPECTED BENEFIT OF PROPOSED SOLUTION	RACKSPACE HOSTED SOLUTION
Average annual system availability	99.95%	80.00%	99.99%
Average hours of annual unplanned system downtime per year	4.4	3.5	0.9
Average number of knowledge workers impact per outage	500.0		500.0
Average productivity impact on knowledge workers during outage	75.0%		75.0%
Annual productivity losses due to availability issues (hours)	1,650.0	1,321.1	328.9
Average fully burdened hour wage for knowledge workers	\$44.50		\$44.50
ANNUAL COST OF PRODUCTIVITY LOSSES DUE TO AVAILABILITY ISSUES	\$73,425	\$58,789	\$14,636

ANNUAL COSTS	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
Current (as is) costs	\$73,425	\$80,768	\$88,845	\$97,730	\$107,503
Proposed (to be) costs	\$14,636	\$16,100	\$17,710	\$19,481	\$21,429
Reduction in productivity losses from improved availability	\$58,789	\$64,668	\$71,135	\$78,249	\$86,074
FTE PRODUCTIVITY IMPROVEMENTS	0.73	0.80	0.88	0.97	1.07

PLANNED DOWNTIME - PRODUCTIVITY IMPACT

PLANNED DOWNTIME	SELF-MANAGED ENVIRONMENT	EXPECTED BENEFIT OF PROPOSED SOLUTION	RACKSPACE HOSTED SOLUTION
Annual hours of planned system downtime per year	144.0	80.0%	28.8
Average number of knowledge workers impact per outage	125.0		125.0
Average productivity impact on knowledge workers during outage	5.0%		5.0%
Annual productivity losses due to availability issues (hours)	900.0	720.0	180.0
Average fully burdened hour wage for knowledge workers	44.5		44.5
ANNUAL COST OF PRODUCTIVITY LOSSES DUE TO AVAILABILITY ISSUES	\$40,050	\$32,040	\$8,010

ANNUAL COSTS	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
Current (as is) costs	\$40,050	\$42,053	\$44,156	\$46,364	\$48,682
Proposed (to be) costs	\$8,010	\$8,411	\$8,832	\$9,274	\$9,738
Reduction in productivity losses from improved availability	\$32,040	\$33,642	\$35,324	\$37,090	\$38,945
FTE PRODUCTIVITY IMPROVEMENTS	0.40	0.42	0.44	0.46	0.48

BUSINESS AGILITY - PRODUCTIVITY IMPACT

BUSINESS AGILITY	SELF-MANAGED ENVIRONMENT	EXPECTED BENEFIT OF PROPOSED SOLUTION	RACKSPACE HOSTED SOLUTION
New application projects per year	3		3
Average system provision time per application (days)	65	61.5%	25
Average annual value in productivity improvement per app	\$500,000		500,000
Average lost productivity improvement value per system provisioning	\$89,041	\$54,794	\$34,247
ANNUAL VALUE OF PRODUCTIVITY LOSSES DUE TO SYSTEM PROVISIONING	\$267,123	\$164,382	\$102,741

BUSINESS AGILITY	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
Current (as is) costs	\$267,123	\$293,835	\$323,219	\$355,541	\$391,095
Proposed (to be) costs	\$102,741	\$113,015	\$124,317	\$136,749	\$150,424
Reduction in productivity losses from improved availability	\$164,382	\$180,820	\$198,902	\$218,792	\$240,671

UNPLANNED DOWNTIME - BUSINESS COSTS

UNPLANNED DOWNTIME	SELF-MANAGED ENVIRONMENT	EXPECTED BENEFIT OF PROPOSED SOLUTION	RACKSPACE HOSTED SOLUTION
Average annual system availability	99.95%	80.0%	99.99%
Average hours of annual unplanned system downtime per year	4.4	3.5	0.9
Estimated revenue or equivalent cost per hour of unplanned downtime	\$50,000		\$50,000
Annual business losses due to availability issues	\$220,000	\$176,150	\$43,850
Net incremental contribution	22.0%		22.0%
ANNUAL INCREMENTAL MARGIN CONTRIBUTION	\$48,400	\$38,753	\$9,647

ANNUAL COSTS	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
Current (as is) costs	\$220,000	\$242,000	\$266,200	\$292,820	\$322,102
Incremental margin contribution	\$48,400	\$53,240	\$58,564	\$64,420	\$70,862
Proposed (to be) costs	\$43,850	\$48,235	\$53,059	\$58,365	\$64,202
Incremental margin contribution	\$9,647	\$10,612	\$11,673	\$12,840	\$14,124
Reduction in business loss from improved availability	\$176,150	\$193,765	\$213,141	\$234,455	\$257,900
INCREMENTAL MARGIN CONTRIBUTION	\$38,753	\$42,628	\$46,891	\$51,580	\$56,738

PLANNED DOWNTIME - BUSINESS COSTS

PLANNED DOWNTIME	SELF-MANAGED ENVIRONMENT	EXPECTED BENEFIT OF PROPOSED SOLUTION	RACKSPACE HOSTED SOLUTION
Average hours of annually planned system downtime per year	144.0	80.0%	28.8
Estimated revenue or equivalent cost per hour of planned downtime	\$10,000		\$10,000
Annual business losses due to availability issues	\$1,440,000	\$1,152,000	\$288,000
Net incremental contribution	22.0%		22.0%
ANNUAL INCREMENTAL MARGIN CONTRIBUTION	\$316,800	\$253,440	\$63,360

BUSINESS AGILITY	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
Current (as is) costs	\$1,440,000	\$1,584,000	\$1,742,400	\$1,916,640	\$2,108,304
Incremental margin contribution	\$316,800	\$348,480	\$383,328	\$421,661	\$463,827
Proposed (to be) costs	\$288,000	\$316,800	\$348,480	\$383,328	\$421,661
Incremental margin contribution	\$63,360	\$69,696	\$76,666	\$84,333	\$92,766
Reduction in business loss from improved availability	\$1,152,000	\$1,267,200	\$1,393,920	\$1,533,312	\$1,686,643
INCREMENTAL MARGIN CONTRIBUTION	\$253,440	\$278,784	\$306,662	\$337,328	\$371,061

BUSINESS AGILITY - REVENUE IMPACT

BUSINESS AGILITY	SELF-MANAGED ENVIRONMENT	EXPECTED BENEFIT OF PROPOSED SOLUTION	RACKSPACE HOSTED SOLUTION
New application projects per year	3		3
Average system provision time per application (days)	65	61.5%	25
Average annual revenue value per app	\$500,000		\$500,000
Average lost revenue per system provisioning	\$89,041		\$34,247
Annual value of potential revenue losses due to system provisioning	\$267,123	\$164,382	\$102,741
Net incremental contribution	22.0%		22.0%
ANNUAL INCREMENTAL MARGIN CONTRIBUTION	\$58,767	\$36,164	\$22,603

BUSINESS AGILITY	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
Current (as is) costs	\$267,123	\$293,835	\$323,219	\$355,541	\$391,095
Incremental margin contribution	\$58,767	\$64,644	\$71,108	\$78,219	\$86,041
Proposed (to be) costs	\$102,741	\$113,015	\$124,317	\$136,749	\$150,424
Incremental margin contribution	\$22,603	\$24,863	\$27,349	\$30,084	\$33,092
Reduction in business loss from system provisioning	\$164,382	\$180,820	\$198,902	\$218,792	\$240,671
INCREMENTAL MARGIN CONTRIBUTION	\$36,164	\$39,781	\$43,759	\$48,135	\$52,949

Security, compliance and risk mitigation costs breakout

SECURITY AND COMPLIANCE COSTS SUMMARY

SECURITY, COMPLIANCE AND RISK MITIGATION	YEAR 1	YEAR 2	YEAR 3	TOTAL
Managed security solution costs	\$113,000	\$122,040	\$131,803	\$366,843
Vormetric Encryption and Key Management	included	included	included	included
CrowdStrike (host visibility and malware prevention on quest system)	included	included	included	included
Splunk (big data ingestion and processing providing real-time query and alerting)	included	included	included	included
Rapid7 (VA scans)	included	included	included	included
AlertLogic (TM, LM)	included	included	included	included
Tanium (endpoint management)	included	included	included	included
ServiceNow (ticketing for security operations, CMDB)	included	included	included	included
SECURITY AND COMPLIANCE (RISK MITIGATION)	\$113,000	\$122,040	\$131,803	\$366,843

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Rackspace is the #1 provider of IT as a service, in today's multi-cloud world. We deliver certified expertise and integrated managed services across public and private clouds, managed hosting and enterprise applications. Because Rackspace partners with the leading technology providers, including Alibaba®, AWS, Google, Microsoft®, OpenStack®, Oracle®, SAP® and VMware®, we are uniquely positioned to provide unbiased advice on the technologies that will best serve each customer's specific needs. Rackspace was named a leader in the 2017 Gartner Magic Quadrant for Public Cloud Infrastructure Managed Service Providers, Worldwide and has been honored by Fortune, Glassdoor and others as one of the best places to work. Based in San Antonio, Texas, Rackspace serves more than 150,000 business customers, including a majority of the Fortune 100, from data centers on five continents.

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