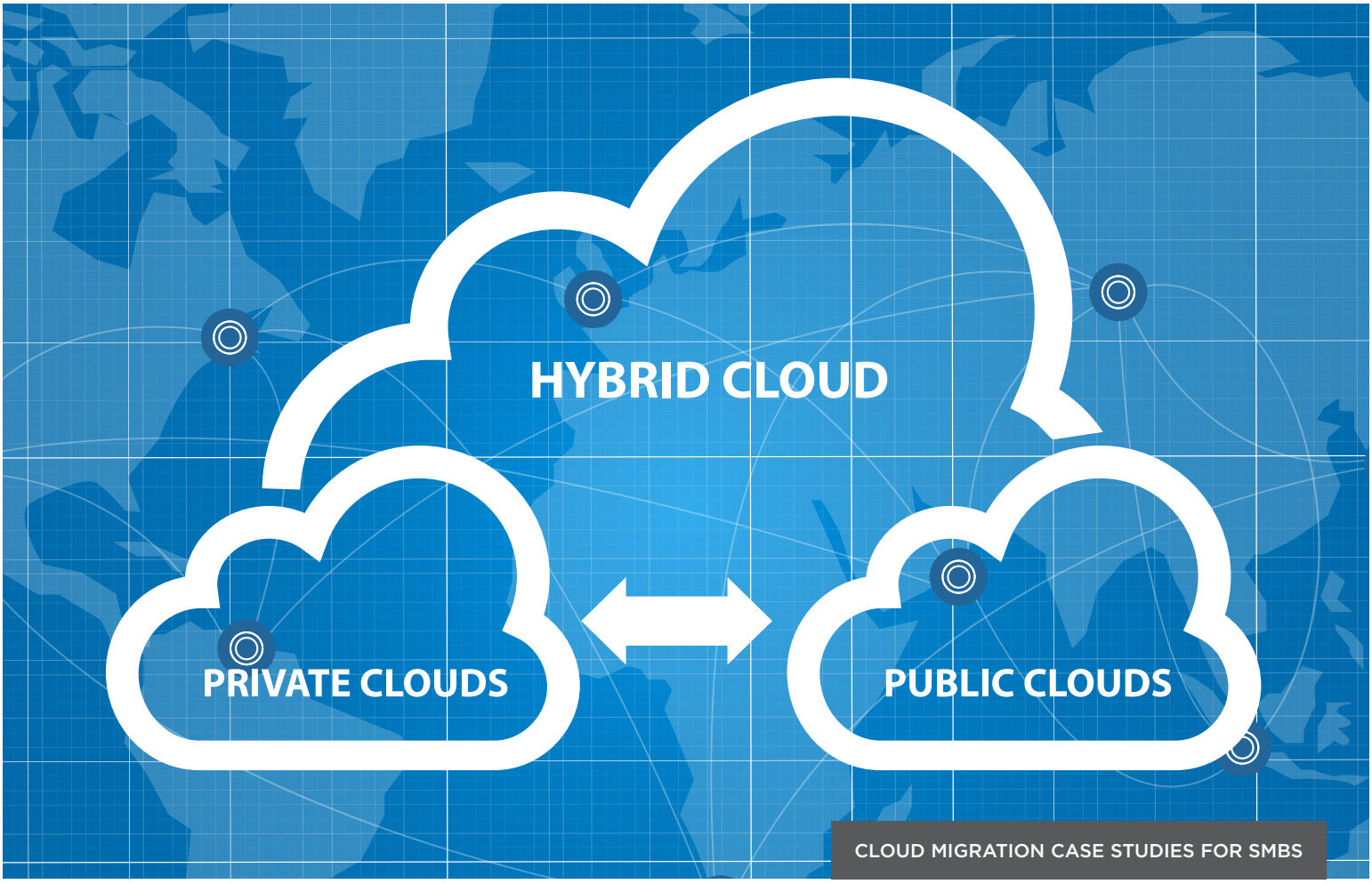
CPA CHARTERED PROFESSIONAL ACCOUNTANTS CANADA

Cloud Migration Case Studies for SMBs

DECIDING WHETHER TO MIGRATE



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Deciding Whether to Migrate

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Executive Summary

Overview

Cloud computing plays an important role in supporting many organizations' digital transformation initiatives. Since the COVID-19 pandemic, digital adoption has accelerated, and the importance of cloud-technologies has been magnified. It is important, now more than ever, to ensure you select the appropriate computing environment to support your business needs.

The case studies featured in this publication document the real-world experience three Canadian small-to-medium businesses (SMBs) had in deciding whether to migrate their business applications and related data to a cloud-based environment:

- Penner Farm Services Group, a manufacturer of agricultural equipment in Manitoba
- the City of Charlottetown in Prince Edward Island
- a boutique accounting firm in Toronto, Ontario wishing to remain anonymous

The publication builds upon the foundational knowledge of cloud computing provided in CPA Canada's ***Cloud Computing Technology Spotlight***.

Issue

The organizations featured in the case studies were intrigued by the idea that cloud computing can enable faster innovation, flexible resourcing, and economies of scale. At the outset, the perception within each organization was that migrating their business applications from an on-premises computing environment into a cloud-based environment would be an optimal business decision. However, through investigations and assessments, these organizations learned that a cloud-based environment is not the only computing environment available, nor is it necessarily the optimal one; they may find one of the following options better suits their needs:

1. Maintain an on-premises environment.
2. Establish a hybrid environment, which integrates on-premises and cloud-based environments on a single control plane.

Solutions

Two of the three organizations opted for cloud migration but chose very different cloud-service models, as summarized below:

Organisation	Starting point	Goal	Chosen end point	Rationale
Penner Farm Services Group	• **business application:** Microsoft Dynamics • **computing environment:** on-premises	to consolidate Penner's enterprise resource management application (ERP) data with that of its newly partnered company for ease of access and efficiency	• **business application:** Microsoft Dynamics • **computing environment:** hybrid • **cloud-service model:** infrastructure as a service (IaaS) for access to additional storage capacity	• integrated disparate IT systems in a cost-effective manner • maintained flexibility to scale computing needs with future business growth
City of Charlottetown	• **business application:** a legacy enterprise resource planning (ERP) application from Oracle • **computing environment:** on-premises	• to upgrade the finance department's ERP to one that would integrate with that of other City departments • to eliminate the burden of software licensing compliance audits	• **business application:** Microsoft Dynamics • **computing environment:** cloud-based • **cloud-service model:** IaaS for hosted servers, while retaining an on-premises software licensing model for the business application	• minimized complexity of complying with software licensing audits • reduced upfront capital costs related to IT environment

Organisation	Starting point	Goal	Chosen end point	Rationale
Accounting Firm in Toronto	• **business application:** QuickBooks Desktop • **computing environment:** on-premises	• to enable clients' access to their accounts in real time • to facilitate remote access to the firm's key ERP	• **business application:** QuickBooks Online • **computing environment:** cloud-based • **cloud-service model:** software as a service (SaaS) for QuickBooks Online	• provided clients with real-time access to their records • improved performance, reliability and security

Key learnings

Migration of business applications to a cloud-based environment may indeed offer multiple benefits to an SMB. To identify the most optimal environment for your particular organization and applications, these steps will help with the decision-making process:

1. an assessment of the organization's particular needs, constraints, and priorities
2. a total cost of ownership (TCO) assessment
3. consideration of the key learnings detailed at the end of each case study and summarized in the conclusion of this publication

Introduction

Cloud computing has changed the way computing services are delivered, enabling faster innovation, flexible resourcing, and economies of scale. For an introduction to cloud computing and the associated benefits and risk areas, refer to CPA Canada's ***Cloud Computing Technology Spotlight***.

This publication builds upon the foundational knowledge of cloud computing and features case studies aimed at aiding members in small-to-medium businesses (SMBs) who are interested in migrating their business applications to an optimal environment for managing organizational data. While cloud-based environments are popular, they may not be the best fit for all SMBs in all circumstances. In certain instances, an on-premises or hybrid environment may be more optimal.

The case studies are intended to shed light on key considerations for choosing and implementing a solution that best aligns with an SMB's needs and objectives and that may be the most likely to improve the cost-effectiveness of information technology (IT) spend and organizational agility.

What are your options?

Traditionally, business applications such as customer relationship management (CRM) and enterprise resource planning (ERP) software have been located on premises, within an organization's own IT infrastructure. Today, relocation of these applications to the cloud has become an increasingly popular choice, but it certainly is not the only option.

The possible environments for housing your business applications can be categorized into the following three main types:

1. **On-Premises**

An on-premises environment refers to the housing of business applications on your organization's own IT infrastructure. The environment is primarily operated and secured by your organization, who incurs the costs involved in managing, licensing, securing and maintaining the environment along with the data input into it.

2. **Cloud-Based**

A cloud-based environment refers to the housing of software, data, or storage space and other infrastructure in the "cloud," i.e., on the Internet. Such an environment is also sometimes referred to as "the public cloud" – not because the environment is publicly accessed, but rather because the provider's IT infrastructure services multiple organizations. Some organizations, however, opt instead to establish a "private cloud" on a host's infrastructure, which is dedicated exclusively to the organization.

Cloud-based environments are divided into three sub-groups:

- infrastructure as a service (IaaS)
- platform as a service (PaaS)
- software as a service (SaaS)

QuickBooks Online, Microsoft 365, Google Docs, Salesforce, Gmail, DropBox, Oracle ERP Cloud are all examples of SaaS.

3. **Hybrid**

A hybrid environment is one that employs both an organization's private infrastructure and a third-party cloud, with integration of the two environments to allow data and business applications to be shared between them for the sake of redundancy and flexibility / accessibility.

Which option is optimal for your organization?

You might be interested in helping your organization to implement its first-ever business application, to replace its existing business application with a more optimal solution or to house an application in a different IT environment for ease of access. Although these end goals are different, the first step toward them will ideally be the same: an assessment of your organization's needs. The following case studies illustrate how knowing these needs assists you in determining the most optimal IT environment for your business applications. For a comparative analysis of the features of each computing environment, please see Appendix I.

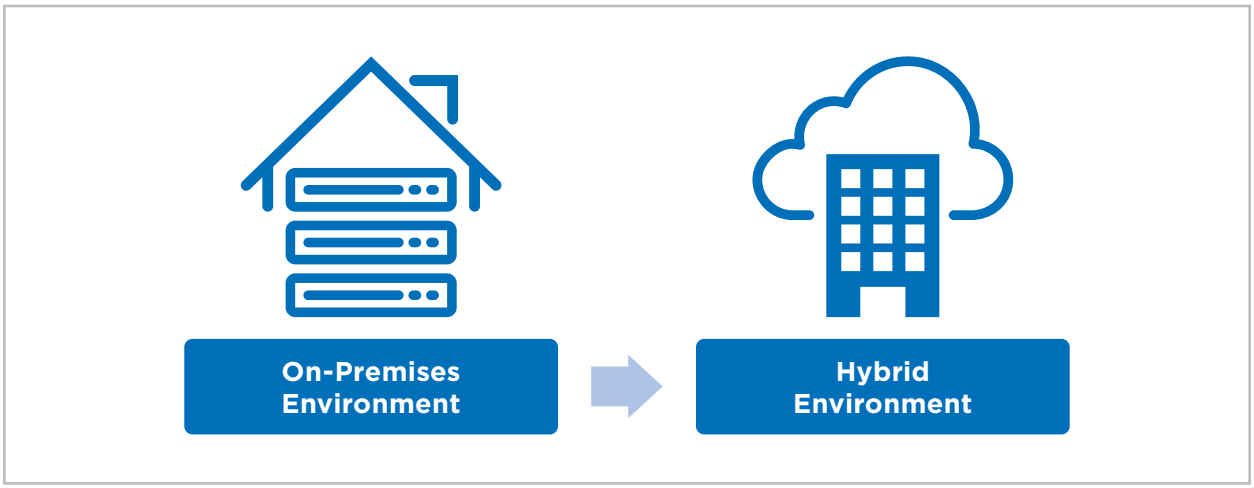
Case Studies

In the following case studies, we will examine the computing needs of Penner Farm Services, the City of Charlottetown, and a small urban accounting firm, as well as each organization's decision concerning cloud migration. While these case studies are not meant to encompass an exhaustive list of items all organizations should consider, they should serve as a starting point.

You will note that each case is presented in first person, using "we" and "our" to describe the experience from the organizations' point of view.

Penner Farm Services Group

Investigating Migration From an On-Premises Environment to a Hybrid Environment



Background

Penner Farm Services Group (PFSG) is an SMB that has been part of the Canadian agricultural sector since 1956. With our headquarters in Blumenort, Manitoba, we facilitate the efficient management of hog, poultry and dairy farms by offering:

- automated livestock equipment, such as feeding and watering systems
- supplies, such as hardware and apparel
- services, such as equipment rentals

Issue

Over the course of more than 70 years in business, our company has experienced significant change; from the evolution of our product offerings over the years to corporate expansion and restructuring in more recent years, we have grown and continue to grow.

Since our company's inception, our leadership team has asserted that technology should be utilized to assist and improve business performance. With our continued growth, however, it has become increasingly pertinent to us to drive for efficiencies through technology and to innovate to meet our customers' needs and expectations.

Trigger for Action

To expand our agricultural offerings across the prairie provinces, we formed a strategic partnership with Horizon Livestock & Poultry Supply and Paradigm Agri-Solutions in 2016 and then with Western Ag Systems (WAS) in 2019.

At the time of our partnership with WAS, we each were using separate enterprise resource planning (ERP) software applications, which were stored on premises by each partner, with off-site backup systems. Our ERP applications were used to manage a variety of business activities, including material purchasing, inventory control, and accounting and finance. PFSG was using Microsoft Dynamics GP, while WAS was using another legacy ERP.

Led by our chief finance officer and corporate controller – both of whom are CPAs – the PFSG finance team decided to explore options for migrating WAS's ERP data into PFSG's Dynamics ERP and housing both in a single storage system that both partners could access from their physically separate headquarters. The primary goal of such an integration was to provide a central repository for ERP data to achieve increased efficiency, ease of access and improved tracking.

Approach

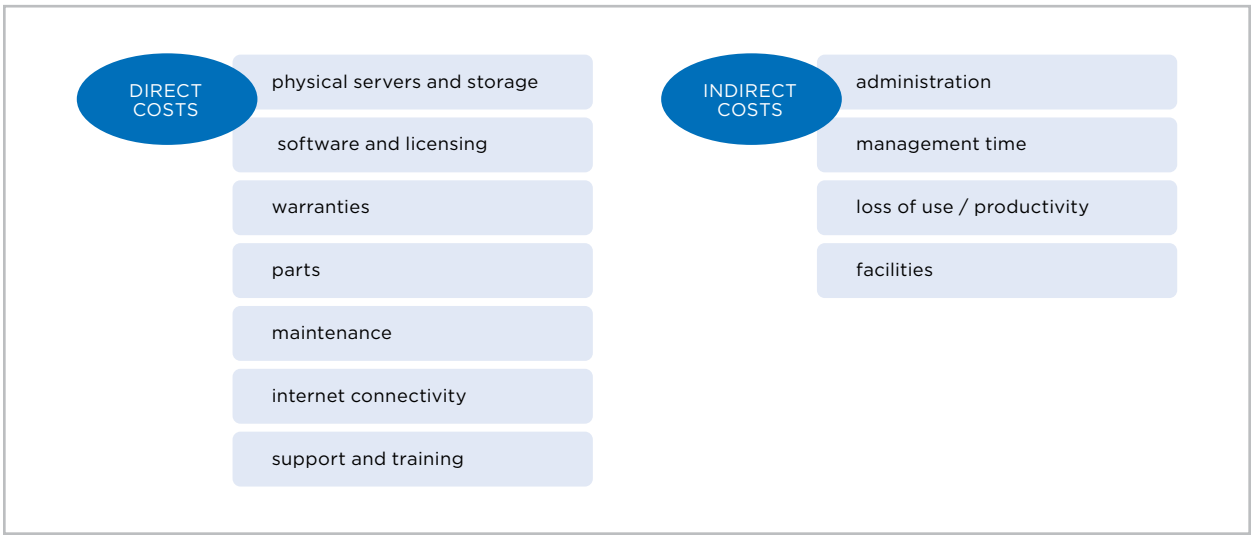
The finance team appointed our director of information technology (IT) as the migration architect for the project. This role is responsible for:

- investigating the technical requirements of the integration of WAS's ERP data with PFSG's
- identifying which IT environments were options for housing the integrated ERPs and data
- determining the value of executing a migration to each type of environment
- designing and implementing a technical plan for the migration

Our director of IT, supported by several staff members dedicated to his team, first explored the option of housing PFSG's and WAS's ERPs and data on premises at PFSG's headquarters. To assess whether this would be a viable option, he undertook a total cost of ownership (TCO) analysis to essentially audit our existing on-premises platform and related costs.

This was a particularly important first step for us, as we had recently invested in implementing a new on-premises server at PFSG, and we were interested in assessing the long-term value of continuing to use it. So, the purchase price of our new server was included in the TCO analysis, as well as the related direct and indirect costs over the predicted lifespan of the server, as illustrated in the following figure.

TOTAL COST OF OWNERSHIP (TCO) CONSIDERATIONS FOR EXISTING PLATFORM



Our new server was, however, almost at capacity and would not support WAS's ERP data in addition to our own. Thus, the TCO analysis was completed twice: once to assess the long-term value of continuing to use the on-premises platform at PFSG, which would necessitate finding a separate solution for WAS, and again to assess the value of investing in:

- an additional server that would house both PFSG's and WAS's ERP data on premises, at PFSG's headquarters
- the creation of a private cloud that could be accessed remotely by WAS

Next, our director of IT turned his attention to the following cloud-based options:

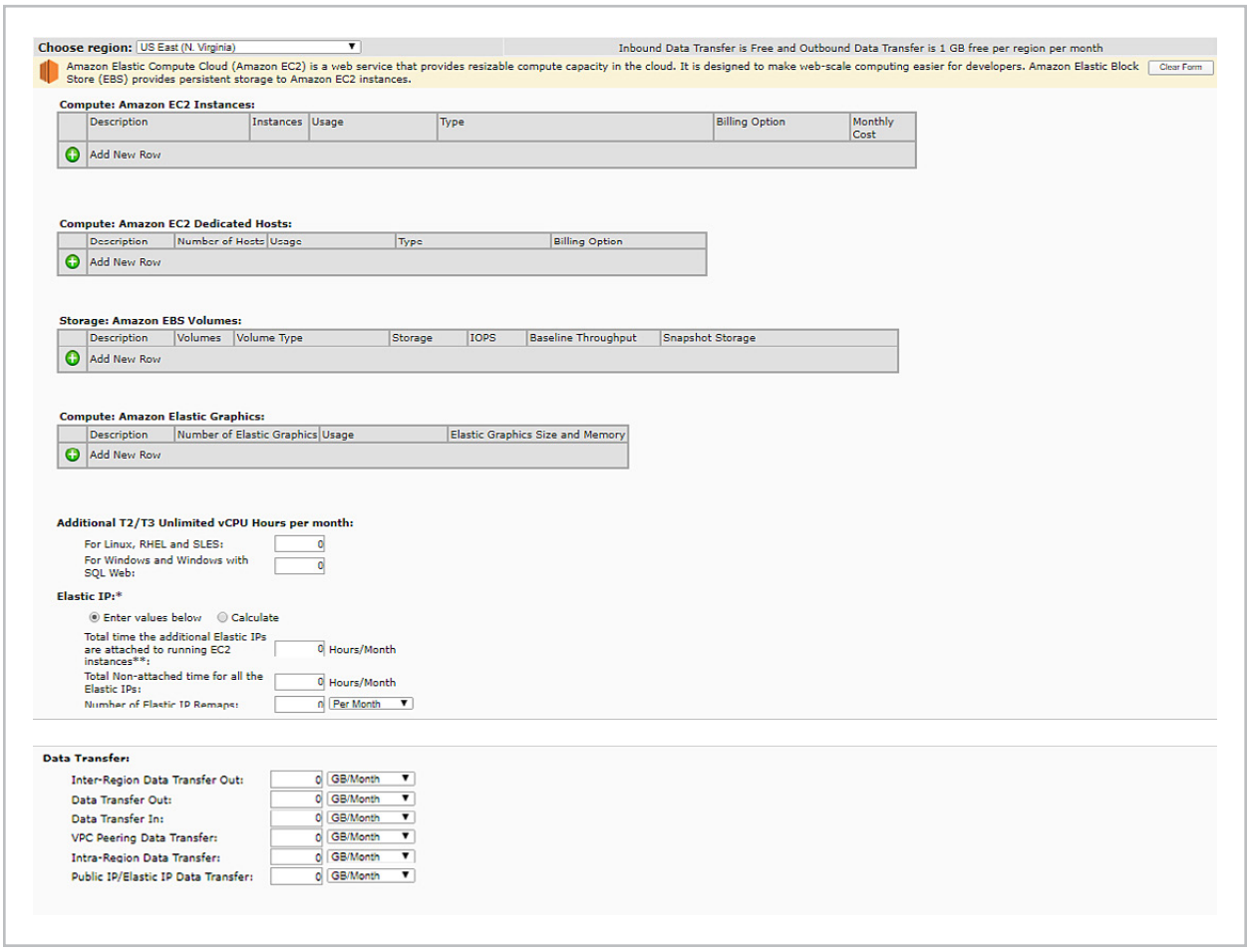
- subscribing to cloud-based ERP SaaS, such as Microsoft Dynamics 365, and migrating both PFSG's and WAS's related ERP data to the cloud
- establishing a hybrid solution by subscribing to cloud-based infrastructure as a service IaaS, such as Microsoft Azure, and using the IaaS subscription to manage WAS's data and PFSG's on-premises software and IT environment via a single, integrated control panel

The TCO analyses of these options benefitted greatly from cloud-cost calculators available on the websites of many cloud-computing providers, for example:

- Amazon Web Services (AWS) Pricing Calculator
- Microsoft Azure Pricing Calculator
- IBM Cloud Cost Estimator

Such calculators prompted us to enter the physical details and performance metrics of our existing on-premises platform, including configuration details, memory size and operating system, along with our storage footprint details and data migration needs, and they provided an estimate of the cloud-usage charges for our requirements.

STANDARD FIELDS IN A TCO CLOUD-MIGRATION CALCULATOR – AWS EXAMPLE



Source: AWS Simple Monthly Calculator (calculator.s3.amazonaws.com/index.html)

Finally, our director of IT compiled a comparative spreadsheet analysis of all the options and presented it to our finance team. The time invested in the analysis ensured that our finance team was able to compare our computing options in like terms rather than on an "apples-to-oranges" basis.

Outcomes

Although our finance team had originally anticipated that moving PFSG's and WAS's ERPs to a cloud-based environment would be the optimal solution to achieve our objectives, review of the comparative TCO analyses revealed that this was not, in fact, the case, due to the following main factors:

Cost

Cost per User	Number of Users	Total
$100–$150/month per user (networking and licensing)	~ 150 at Penner ~ 15 at WAS	$10,000–$15,000/ month

Cost investigations for a cloud-based environment revealed that:

1. SaaS subscription fees were based on the number of users, and our relatively low number did not enable us to qualify for volume discounts.
2. We would be required to pay for cloud-based ERP software licensing in addition to the licensing fees that we already pay for our on-premises ERP software.
3. The cost of three months of SaaS cloud access was approximately the same as purchasing a new on-premises server.

As well, the recent update of our on-premises environment was viewed as a significant capital expenditure that had not been fully utilized.

Service redundancies

Many of the IT-management services offered by the SaaS providers we consulted overlapped with those already provided by our internal IT department, which meant that we would be paying for redundant services. Reducing our already small IT staff was not a viable option to counter such redundancy; those employees were considered essential for sustaining business operations by maintaining IT hardware, such as work stations and laptops, which would remain on premises, regardless of whether we subscribed to the cloud.

Our finance team concluded that, at present, it was optimal to keep our ERP applications on-premises. However, at the time of writing, the team is leaning towards a hybrid environment through Microsoft Azure for integration of our newly partnered company's ERP data. This will enable us to have greater internal control of our IT system than a full public-cloud migration would, to continue to use our on-premises ERP software, and to avoid per-user SaaS fees. At the same time, we will gain key cloud benefits, including:

- ongoing hardware updates by the cloud provider
- a monthly IaaS subscription as an operating cost rather than the large capital cost that expansion of our on-premises infrastructure would involve
- an immediate IT capacity increase, which aligns with our corporate growth strategy

We are continuing to explore strategies for the associated cost hurdles.

Learnings

Our key learnings:

1. **Migration to the cloud can be expensive.**

   We learned that in our business, there is not a high enough number of users to result in volume discounts on cloud subscription fees charged on a per-user basis.

   Licensing fees further increase our costs; such fees are charged for access to cloud-based software, even though we already hold licences for our users' access to the on-premises version.

   The age of our organization's on-premises IT infrastructure also increases the cost of switching to a cloud-based environment; capital funds have recently been invested in new infrastructure, so our TCO analysis of the on-premises environment is high.

2. **Migration to the cloud may create service redundancies.**

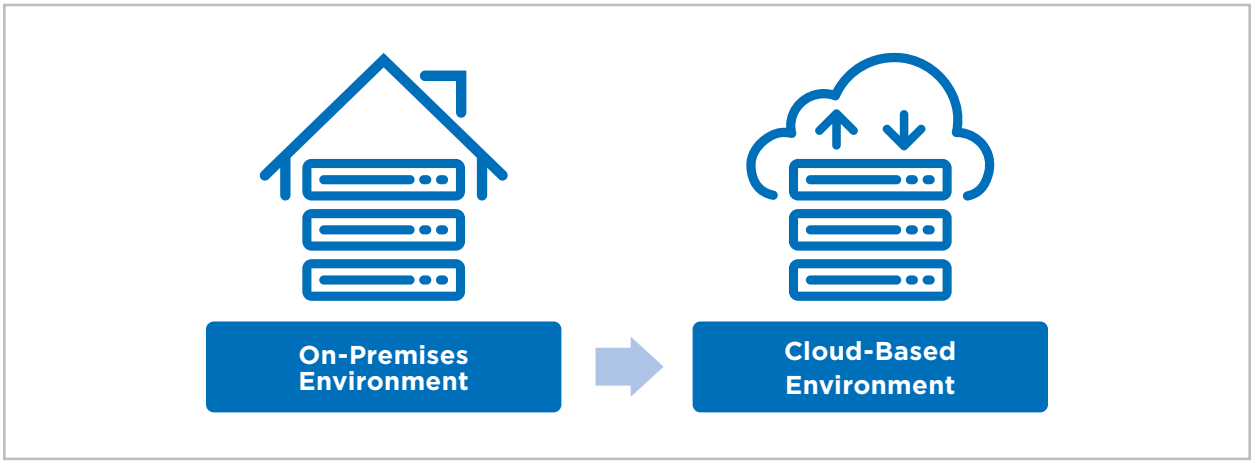
   Most major cloud providers package an array of IT services with their subscriptions. We already have access to these services through our IT department; however, with many of the SaaS options we explored, we were not able to lower subscription fees by opting out of certain services from the cloud provider. We would therefore need to pay for the provider's redundant services if a cloud-based environment were deemed desirable for our ERP, and we would either have to accept the redundancies or consider reducing on-premises IT staffing.

3. **It may be optimal to select more than one computing environment for an organization's business applications.**

   As PFSG already owned its ERP software and was in compliance with licensing requirements, it was the most cost-effective for us to continue to house that software on premises. However, as our internal IT infrastructure was near capacity, we needed to increase capacity to meet the expanded needs of our partnership with WAS. Taking a blended approach and opting for a hybrid environment would allow us to avoid additional capital infrastructure investments and to take advantage of the pay-as-you-go capacity and scalability of IaaS options available through the cloud, without creating redundancies in internal IT staff.

City of Charlottetown

Migrating From an On-Premises Environment to a Cloud-Based Environment



Background

The City of Charlottetown is a flourishing community of approximately 36,000 people located on the south shore of Prince Edward Island.

The Charlottetown Municipal Government, or simply the City of Charlottetown (the City), is a public-sector body, with 550 employees servicing the city's population. Our chief administrative officer oversees all City staff, manages City affairs including the execution of City policies, and works with our mayor and council.

Issue

For the past two decades, the City's Finance Department has used a legacy ERP from Oracle for key financial processes. The ERP was originally hosted off-site by a third party but was more recently brought on premises and owned, via licensing, by the City.

Trigger for Action

By 2019, our legacy financial ERP software and IT infrastructure were still in place, despite having clearly reached the end of their useful life. Our financial ERP did not integrate with our ERP for utility billing or City permits. As such, the desire for systems integration and delivery of improved overarching functionality and efficiency was a significant driver of change. So, too, was our strong desire to mitigate the risks associated with the complexities of software licensing. We had recently been subjected to a licensing audit and were found to be non-compliant with the most current requirements, although we believed that we were still operating all software under a perpetual end user licence agreement (EULA). As a result, we were fined.

We were also interested in identifying a solution that would better facilitate software updates and upgrades. City protocols require that capital expenditure proposals such as those for software and hardware improvements are subjected to a lengthy approval process, which slows down the City's ability to keep up with technological improvements.

Approach

In late 2019, our City's administration turned its attention to IT renewal, with the objective of facilitating migration to a new financial system. Our finance team, led by two CPAs, was tasked with performing a cost-benefit analysis for consolidating several of the City's separate ERPs and for options of where to house the consolidated system. With its expertise in financial planning and a sound knowledge of the municipal budget process, the finance team was optimally positioned for this task. It investigated solutions that would allow the City's resources to focus on core public-service needs, such as financial management and reporting, rather than on hardware and software upgrades.

The finance team undertook total cost of ownership (TCO) analyses to compare options for the ERP environment. (Please see above for details of a TCO analysis for IT infrastructure.) The analyses led the finance team to conclude that a private cloud-based environment would be optimal for several key reasons:

- The City owned the Microsoft Dynamics ERP software, which was already in use by our utilities and city permits departments, and it was in compliance with licensing requirements, thus opting to sign up for a subscription-based ERP would have been redundant.
- However, if the City-owned software was hosted by a third-party cloud provider in the provider's private infrastructure, the provider would assume legal responsibility for keeping our operating system licences up to date, thus mitigating the risk to the City of another licensing audit. This option has the added benefit of allowing us to continue using our existing ERP licenses, which continue to be in compliance.
- The hosted IT infrastructure and software would be maintained up-to-date and would not be delayed by the City's approval protocols.
- IT monitoring and maintenance would be performed by a third party and would not expend valuable City resources such as time and personnel.

Outcomes

The finance team presented a project outline to our administration, and our migration to a private cloud-based environment was successfully approved.

We opted to have our Microsoft Dynamics ERP hosted by a third party in a private cloud, and, through the same cloud provider, to take on an IaaS subscription for our server and a PaaS subscription for our operating system.

It was essential to identify the City staff members who were the best fit, skills-wise, for the migration and who could be dedicated to it full-time. For it to be successful, we needed to ensure that, on one hand, the day-to-day business of the City continued and, on the other, that the most experienced employees were dedicated to the migration project. To strike a balance, a combination of internal staff resources and external consulting experts was designated to the project.

At the time of writing, our migration has been fully implemented.

Learnings

Our key learnings:

1. **The subscription model of cloud computing is highly beneficial to organizations with a limited capital-expenditure budget.**

   Monthly subscription costs for hosted infrastructure and platforms are pay-as-you-go and therefore involve relatively little upfront investment. This flexibility and scalability is particularly important for us as an organization with a limited capital expenditure budget.

2. **Cloud computing enables organizations to reduce compliance risk related to software licensing.**

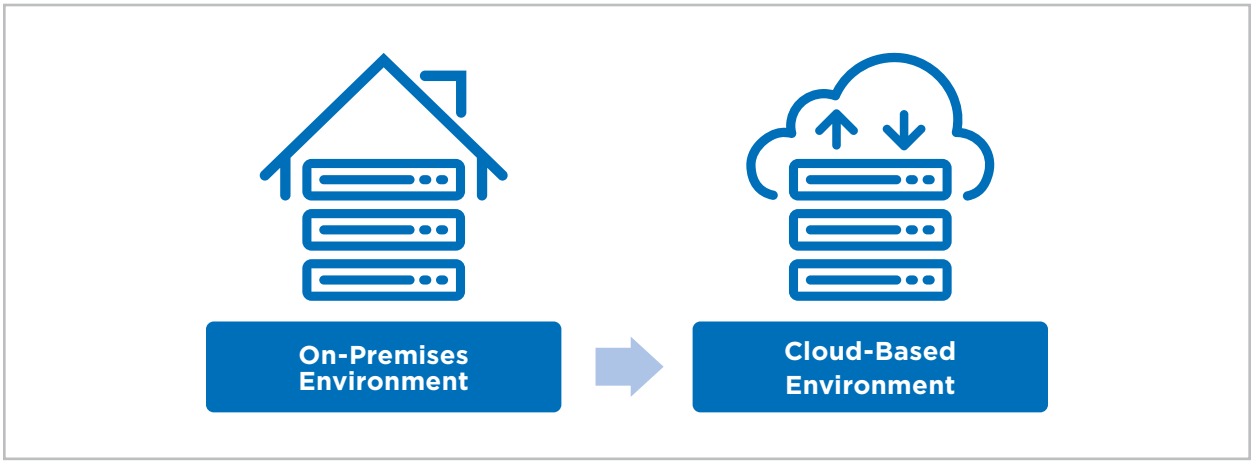
   We have learned that licensing of operating system platforms and software can be very complicated to manage. However, third-party cloud providers often assume responsibility for such licensing. After our organization was subjected to several IT licensing audits, this was highly appealing to us; now, if a licensing audit is conducted, our private-cloud provider is the audited party – not our organization.

3. **Cloud migration can be a gradual process.**

   We learned that cloud migration need not be treated as an all-or-nothing endeavour. It proved not to be optimal, nor essential, to move our ERP applications to a cloud-based environment; rather, we chose to migrate some of our infrastructure and IT platforms for regulatory and financial reasons. If migration of our ERP applications proves to be fiscally optimal in the future, we can pursue options with our current private-cloud IaaS provider or through a public-cloud provider.

Toronto-Based Accounting Firm

Migrating From an On-Premises Environment to a Cloud-Based Environment



Background

We are a boutique accounting firm located in midtown Toronto and have been operating in the financial services sector since 1985. We specialize in tax but also offer expertise in financial accounting, financial information systems, and consulting. Our clients include individuals with varying financial profiles, including some of very high net worth, as well as incorporated businesses of varying size and sector.

For the purpose of confidentiality, we have decided to withhold the name of our firm in this case study.

Issue

Information technology has always been an important tool within our firm, and it has marked our history: We have evolved from sharing a single staff desktop computer when our firm was founded 35 years ago to more recently having our on-premises IT infrastructure consist of a dedicated desktop or laptop computer for each of our team members (with remote access capabilities), with access to a shared drive on which secure data is stored. We are a small enough firm that our IT requirements have not required expansion beyond this hardware.

Over the past two decades, we have purchased accounting, bookkeeping, communications and security software that has been stored in our on-premises environment and updated with new software version releases as necessary. QuickBooks Desktop has been our principal accounting and bookkeeping software. We have purchased this software, updated it as necessary and maintained licensing requirements.

Trigger for Action

In recent years, our firm has encountered increasing demand from clients for access to their accounting and bookkeeping data, such as income and expense reports, in real time. Several clients have opted to use QuickBooks Online (QBO) and have requested our assistance with navigating that environment. Other clients have requested our assistance in setting up their accounts in QBO.

When two tech-savvy team members joined our firm, they brought with them the drive to ensure that our firm meets the increasing digital demands of our clients so that we can remain competitive in a large sector and an evolving profession. To support that, we began investigating IT solutions that could meet our new needs.

Approach

Our starting point was to appoint our client services associate to investigate IT environments for accounting software options that would enable our clients to access their data online in real time. At the outset, we were aware that real-time access would involve access to one of the following:

- a cloud-based environment
- the establishment of a remotely accessible private cloud on premises
- access to a hybrid environment

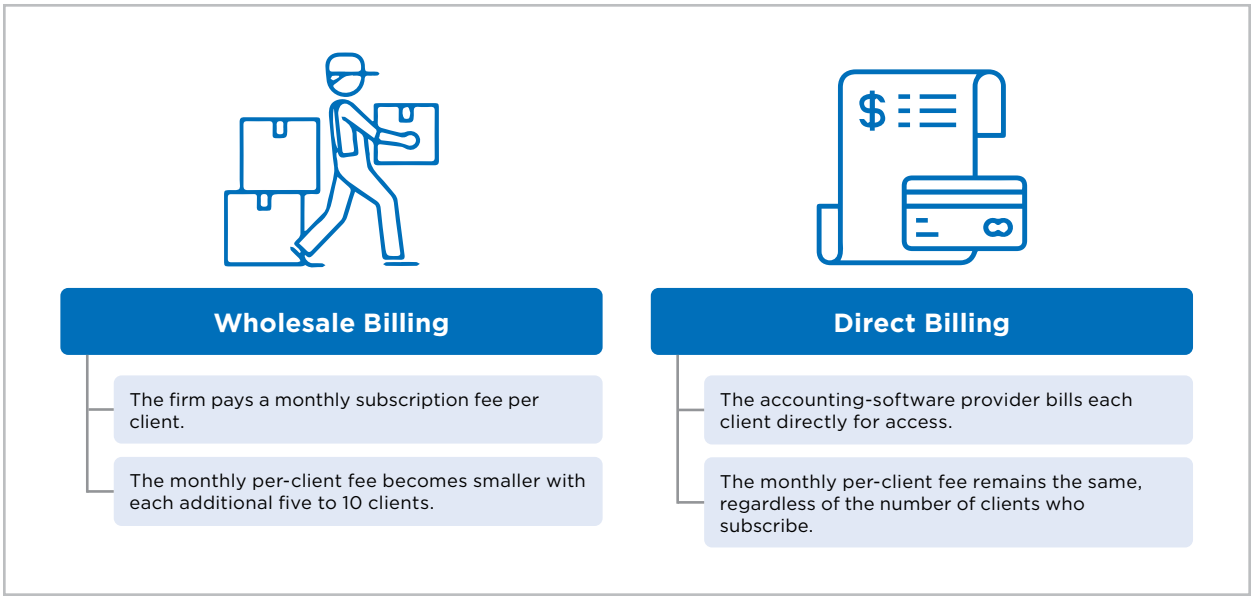
It was quickly realized, however, that the latter two options were neither cost-effective nor user-friendly, for the following reasons:

1. Most major accounting software companies now offer two versions: an accountant-facing version and an accountant-and-client-facing version. The former, like QuickBooks Desktop, which clients could be enabled to access in real time through a private on-premises cloud or a hybrid cloud, is not client-friendly; it requires the accountant to provide a certain level of interpretation for the client.
2. The establishment of a private cloud or hybrid environment for remote access to this version would not result in client satisfaction without a high level of employee involvement, which would require more time expenditure.
3. The accountant-and-client-facing version of accounting software, like QuickBooks Online, is typically only offered in a cloud-based environment via subscription.
4. A number of our clients had specifically asked us to subscribe to widely-used cloud-based accounting software.

Thus, our client services associate was appointed to focus her investigation on cloud-based accounting software options. Her first main consideration: cost. Cost calculations were straightforward, as the websites of the most highly rated cloud accounting software providers offered their detailed pricing options online. All pricing was displayed as a

per-month fee. In some cases, the cloud accounting software was advertised as “free” for use by accounting professionals, with monthly fees charged on a per-person basis for any clients wishing to access their files in accordance with the following options:

STANDARD BILLING OPTIONS FOR CLOUD-BASED ACCOUNTING SOFTWARE



As we have approximately 900 personal clients and 350 corporate clients, we recognized that we would be able to obtain significant economies of scale by opting for wholesale billing and by paying our clients’ monthly subscription costs, provided that many of our clients opted for cloud access to their files.

The second but perhaps most important consideration of our client services associate’s investigation was data security. Our senior partners were firm on the notion that clients’ confidential data should remain on premises; however, we understood that if our clients wished to gain real-time access to their accounts through a cloud-based platform, a certain amount of their data would be held by a third party. Our client services associate therefore wanted to identify cloud-based accounting software providers that meet certain security criteria:

1. stored their Canadian customer data in Canada, so that it was not subject to other countries’ data-protection and privacy regulations
2. incorporated redundancy and backup technologies for protection against downtime and data loss
3. complied with (and, optimally, was audited for compliance to) standards that evaluate privacy and security protocols, such as those included in a system and organization controls (SOC) report (see CPA Canada’s guide to SOC reporting to learn more).

Outcome

Our client services associate presented to our administrative team her research on cloud-based accounting software providers that met our security and pricing criteria. We agreed that QuickBooks Online Accountant, offered as a SaaS subscription, would be the optimal service for our firm for the following key reasons:

1. It met all of our pricing and security criteria.
2. Our employees were already familiar with the QuickBooks Desktop ecosystem.
3. Some of our clients were already using QuickBooks Online (QBO), and thus employees who had assisted clients with this software already possessed a working knowledge of it.

As such, our migration to QuickBooks Online Accountant was approved.

Subsequently, our client services associate completed several free online courses offered by QuickBooks, so that she could become our migration expert and offer training to other staff members. This training was instrumental to a smooth transition to the new software and helped ensure that downtime and errors were minimal.

To date, close to 50 of our clients have opted to access their files through QuickBooks Online. Our firm has opted for wholesale billing and is paying approximately $1,000 per month for our subscription; we are, however, recouping the per-client wholesale cost by including it in each client's end-of-year invoice. Clients have expressed a high level of satisfaction with this service, due to the ease-of-access to their current data and increased transparency they experience, and thus they have not expressed reticence with the increased annual fee.

What began as a gradual realization in recent years that our firm would benefit from offering cloud-based access to clients was greatly expedited in early 2020. The COVID-19 pandemic incited a significant technological shift for our firm, as we were required to shutter our physical office and enable our employees to work from home with remote access and our clients to share their files and documents with us. In a very short period of time, we established an online file-sharing portal for our clients, and we have implemented for our staff several cloud-based software programs, including an accounting workflow management system (CCH iFirm), a financial data retrieval / conversion system (Hubdoc), an intelligent accounts receivable and accounts payable management system (Plooto), and an internal messaging system (Slack). These cloud-based software programs enabled our employees to remain productive and meet our client needs without significant upfront capital investment. This was truly one of the most significant benefits of moving to cloud-based software.

Learnings

Our key learnings:

1. **Migration to the cloud can be expensive, but it can be a value add to clients.**
   Instead of needing to comply with a complicated software licensing structure, we are paying a monthly SaaS subscription fee based on the number of clients that opt for cloud-based access. While this cost may increase in the future if more of our clients choose to access the cloud-based software, we will recoup the monthly fees from those clients at the end of the year, resulting in minimal net impact to the firm's costs. On the client side, they perceive the ability to access their reports in real time as a value-added service and are willing to pay the premium for that access.
2. **Client data may be more secure in the cloud than on premises.**
   The data of our clients who have opted to access their files online is protected by enterprise-quality firewalls, data encryption, and security protocols; constant monitoring and backups; audited privacy and security protocols; and reduced risk of hardware theft or loss. Cloud providers are able to offer a wider array of protections than we are able to offer as a small firm.
3. **Cloud-accessed software results in performance improvements.**
   Our cloud-accessed software is subject to less downtime than our on-premises software tends to be, as it is supported by redundancy technologies. This results in less workflow interruptions for our staff. As well, with cloud-based software, our employees do not need to expend valuable time on IT troubleshooting: expert support for any issues that they encounter in the cloud is available immediately, and the software is automatically secured, backed up and kept up to date.

Conclusion

As CPAs, we play key roles within diverse segments of the economy and provide accounting, business advisory, and managerial skills required for today's complex and evolving environment. Our analytical skills and expertise in organizational efficiency position us well to assess options for an organization's technological advancement. Cloud computing may be one such advancement that you are assessing to keep your SMB ahead of the technological curve. Migration of your business applications to a cloud-based environment may indeed offer multiple benefits to your organization. However, as these case studies have illustrated, the following steps will help you identify with greater certainty the most optimal environment for your business applications:

1. an assessment of your organization's particular needs, constraints, and priorities
2. a total cost of ownership (TCO) assessment
3. consideration of the following key learnings

Key Learnings

The following graphic summarizes the learnings gained by the organizations featured in the case studies. Note that this is a non-exhaustive list of considerations. For further considerations, please see Comparison of Computing Environments in Appendix I, or refer to CPA Canada's *Cloud Computing Technology Spotlight*.

COST

Migration to the cloud can be expensive yet cost-effective.
Per-user cloud subscription fees may be cost-prohibitive to some SMBs, particularly if the organization continues to pay for licensed access to the on-premises version of its business applications.

However, as operating costs, monthly pay-as-you-go cloud subscriptions can be highly beneficial to organizations with a limited capital-expenditure budget and to organizations wishing to avoid potentially complicated on-premises software licensing requirements. In situations where moving to the cloud adds new functionality for clients, there may be an opportunity to pass along the costs to them as well.

RISK

Cloud computing enables organizations to reduce compliance risk related to software licensing.
On-premises software licensing can be complicated to manage. Cloud providers often assume responsibility for software licensing.

SECURITY

Data may be more secure in the cloud than on premises.
Cloud providers are often able to offer a wider array of cybersecurity protections than small organizations can afford to enable on premises.

PERFORMANCE

Cloud-based software may offer performance improvements.
Cloud-based software may be subject to less downtime than on-premises software, as it is often supported by redundancy across geographies. Also, it is typically kept up to date, secured, and backed up – all automatically.

SERVICE

SaaS support is always available.
Cloud providers of software as a service (SaaS) often offer expert round-the-clock support to subscribers.

Migration to the cloud may create service redundancies.
Most major cloud providers package an array of IT services with their subscriptions, which may not be required by organizations with internal IT departments. However, it is usually not possible to opt out of the redundant services from the cloud provider.

SCOPE AND TIMELINE

Cloud migration can be approached as a gradual process.
Cloud migration need not be treated as an all-or-nothing endeavour; it is feasible to initially migrate only select business applications, users and/or infrastructure to the cloud.

It may be optimal to select more than one type of computing environment.
Due to financial, staffing, data sensitivity and/or licensing concerns, it might make the most sense for an organization to simultaneously maintain independent on-premises and cloud-based environments or a hybrid environment rather than aim at full cloud migration as its end goal.

Appendix I: Comparison of Computing Environments

Considerations	On-Premises 	Cloud-Based 	Hybrid 
ACCESSIBILITY	• If access to your organization's business applications is required by off-site users, a VPN connection or a private cloud will need to be created.	• Users can access your organization's business applications from anywhere that an internet connection is available, via tablet, smartphone, laptop, etc.	• Off-site users may require VPN connections to be implemented so that they can access business applications and the associated data.
RECOVERY	• Your organization will need to implement an internal disaster-recovery process.	• The cloud provider manages disaster recovery, which tends to be greatly facilitated by their large number of servers and degree of protective measures.	• Your organization alone or together with the cloud provider may implement and manage the disaster recovery process. • The duality of the integrated environment can be used as a disaster failsafe.

Considerations	On-Premises 	Cloud-Based 	Hybrid 
SCALABILITY	• Users can be internally added or removed as needed; however, additional users may require additional software licences. (See Licensing below.) • Capital investment in expansion of IT infrastructure will be required when additional storage space or processing power is needed.	• Users can be added or removed as needed; however, additional users may increase cloud-access subscription fees. • The user pays for additional cloud-storage space as needed.	• Users might be added or removed either internally or by the cloud provider, depending upon the integration agreement. • Expansion of IT infrastructure is managed either internally or by the cloud host when additional storage space or processing power is needed.
LICENSING	• As your organization is responsible for ensuring compliance with the licensing requirements of your business applications, it may be subject to periodic audits by software companies. • Licensing costs are typically based on the number of users over a set period of time.	• The cloud provider assumes responsibility for compliance with the licensing requirements of your business applications. • Any licensing audits conducted by a third-party software company focus on the cloud provider. • Licensing costs may increase unpredictability in the future.	• Your organization,the cloud provider or both together may assume responsibility for compliance with the licensing requirements of your organization's business applications, depending on the environment in which the applications are housed.

Considerations	On-Premises 	Cloud-Based 	Hybrid 
CONTROL	• Your organization maintains complete control over its data and has the ability to restrict external access to the data. • The organization decides when to update its licensed software • The software can often be customized to your organization's needs.	• Your organization's data is located on a server that it does not own. • The organization's ability to extract its data may be difficult, should you wish to relocate it to a different system or integrate with non-natively supported applications. • Data stored outside Canada may be subject to other countries' data-protection and privacy regulations, • The cloud provider maintains control over software version releases and updates and may restrict software customization.	• Your organization maintains a high degree of control over its data. • Depending on the environment in which business applications are housed, your organization may have control over the timing of software updates and over software customization.

Considerations	On-Premises 	Cloud-Based 	Hybrid 
SUPPORT	• All aspects of your organization's IT infrastructure and business applications are managed mainly in house, including updates and upgrades.	• The cloud provider typically offers round-the-clock support for the type of cloud-computing service model to which your organization subscribes (SaaS, IaaS, or PaaS).	• Your organization's internal IT staff typically work with the cloud provider to maintain the integrated infrastructure, which tends to reduce reliance on internal IT staff and free up time for other IT maintenance tasks, such as desktop and laptop maintenance.
COST	• The cost of purchasing and expanding IT infrastructure and software is a large capital investment. • Enabling mobile access is an additional capital cost. • Your organization's maintenance of IT infrastructure and compliance with licensing requirements are ongoing operating costs.	• Subscription costs are typically classified as operating rather than capital expenses. • As such, this option involves relatively little upfront investment. • However, subscription costs may increase unpredictably in the future.	• Hybrid costs differ depending on the model. Typically, the organization will continue to have operating costs to maintain its on-premises IT infrastructure, and it will have additional costs for SaaS, IaaS or PaaS, either as a monthly subscription or as an annual fee.
OBSOLESCENCE	• There is greater risk of obsolescence.	• There is low risk of obsolescence.	• There is relatively low risk of obsolescence.

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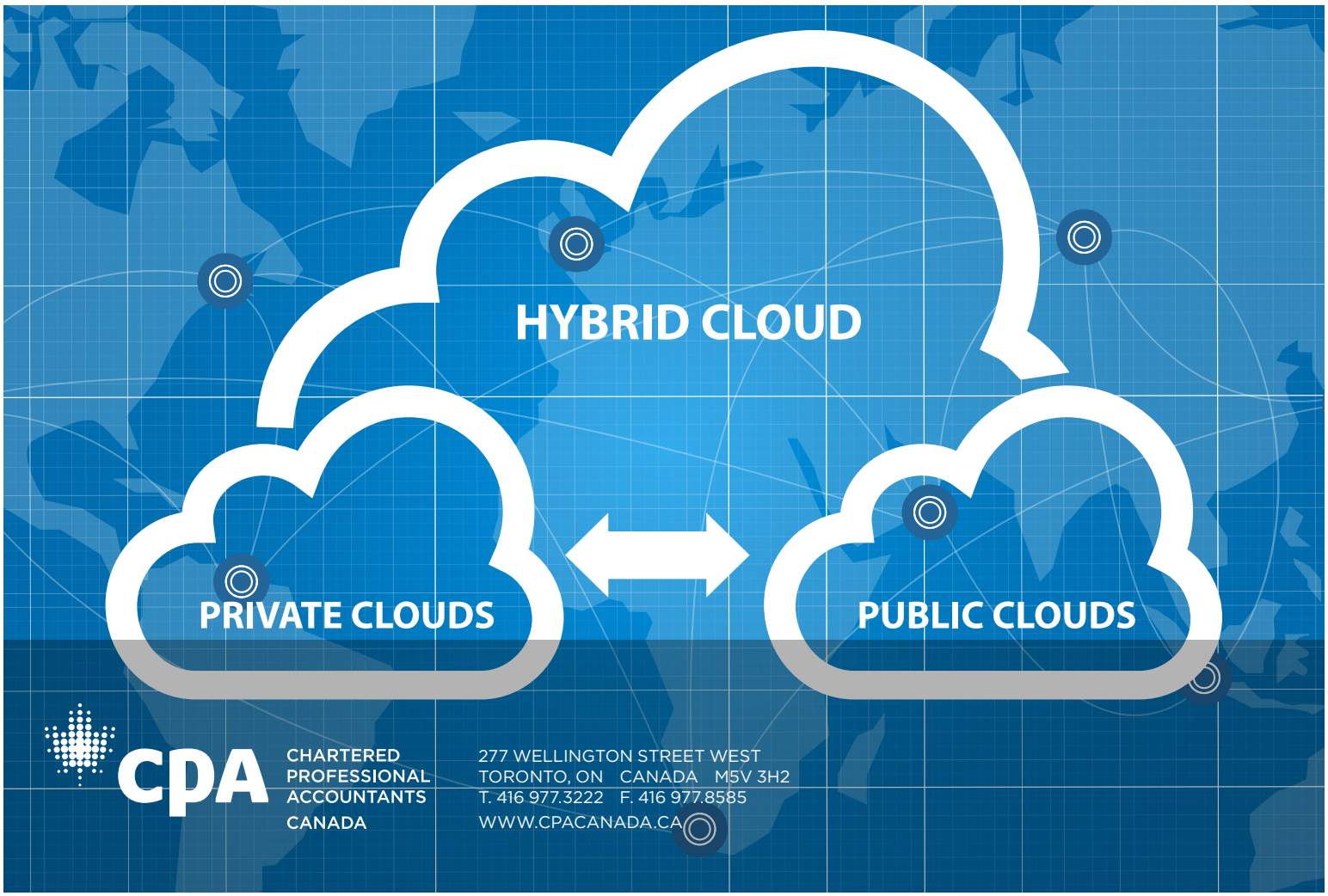

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