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# TO CLOUD OR NOT TO CLOUD?

## THAT IS THE QUESTION

*By Jerry Horton, Technology Director*

*Since the 'cloud' came on the scene, there has been confusion, fear, curiosity, even overenthusiastic acceptance. What is lacking is a plain language, common sense guide to make business decisions about cloud computing. Here at Networks Plus, it is our goal to design solutions that align with your business needs, not only for today, but as your business grows. Networks Plus has, after an exhaustive search, selected the Microsoft Azure platform as our cloud offering. While this white paper is intended to provide general information regarding cloud computing, we will note specifics regarding the Azure platform as appropriate. With that in mind, let's dive into the pros and cons of cloud computing.*

### THE 'CLOUD': WHAT IT IS AND WHAT IT IS NOT?

If you have an internal network with shared resources -i.e. files stored on a remote drive or printers not attached directly to your machine – congratulations! You've been using the 'cloud' all along! The buzzphrase 'cloud' has been much abused and misinterpreted. In the simplest scenario, a 'cloud' is a set of resources that is not installed on your machine; it is a 'private cloud' if you have all of the resources installed on a network that you own, operate, and control, generally speaking. It is a 'public cloud' if you are renting some or all of the resources from a reliable source and using a to store your data and/or run your operational workloads, such as a websites or databases. 'Public Cloud' resources are accessed using public IP addresses, meaning that they can be directly addressed from anywhere on the Internet; however, these resources still require proper authentication and authorization to access. A design worth mentioning is 'hybrid cloud'. This means that some of your resources are located in a private cloud and others are in a public cloud and that the two communicate with each other. A hybrid architecture, being a blended approach, will carry some additional costs, but may be the best solution for legacy line-of-business applications that are not prepared for public cloud access.

A few other acronyms that are tossed about need some clarification. They are specific to cloud computing and so deserve some discussion.

- Infrastructure-as-a-Service or IaaS – Simply put, this means that you are using the public cloud to replace on-premise servers. You are renting bandwidth, processor time, memory usage, and storage from a cloud vendor. In general, these services are usage-based, meaning you pay for what you consume, much like your water or electric bill. You may or may not be required to pay additional licensing fees for operating systems and applications, depending on your needs and the cloud vendor you choose. NOTE: Operating system licenses are included as a part of the Azure service.
- Platform-as-a-Service or PaaS –

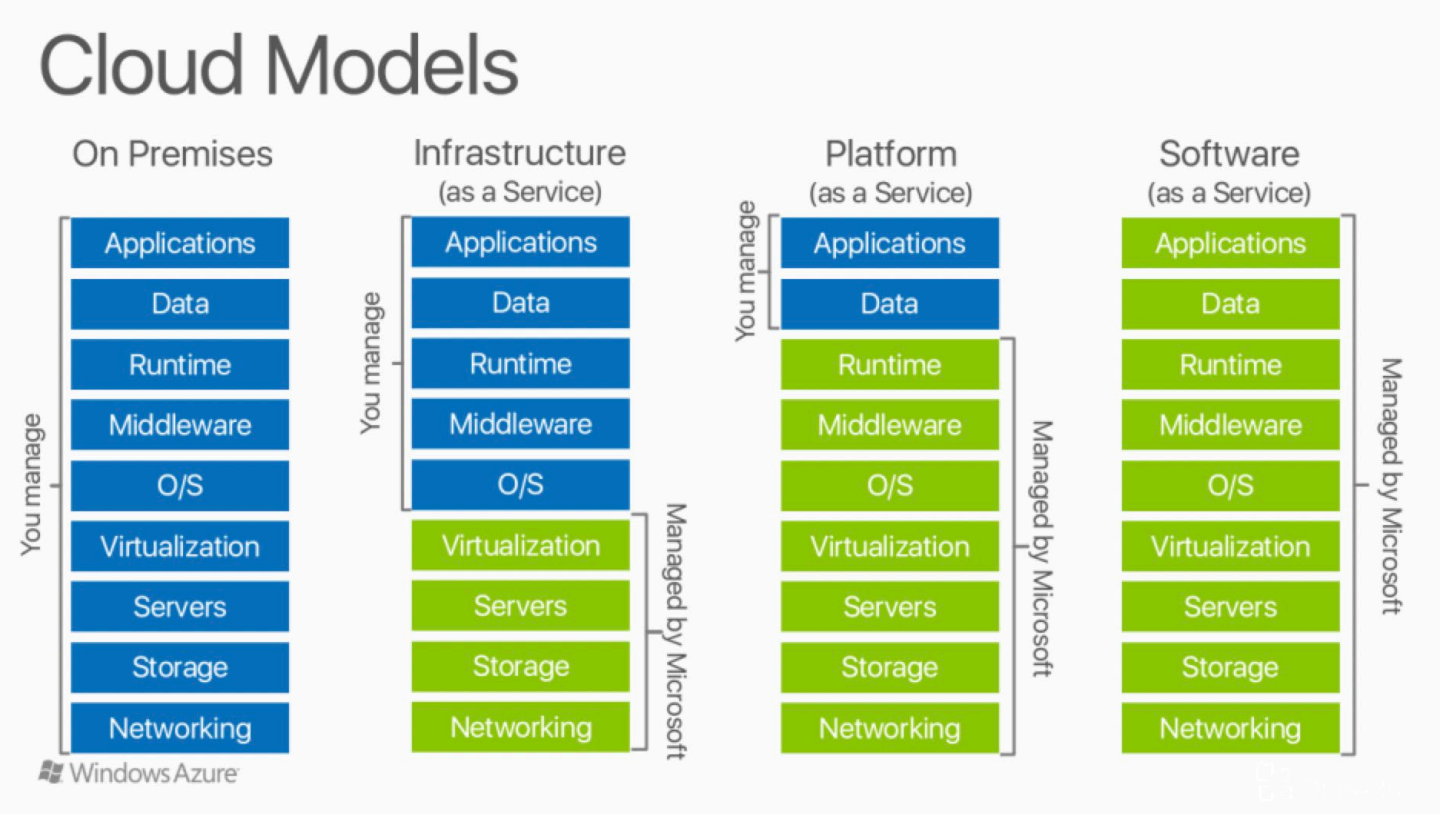
Just as with IaaS, you are renting the computing resources from a public cloud vendor based on usage, but PaaS will also include licensing and basic configuration for specific types of operating systems and applications - such as databases, business intelligence, or application development platforms. PaaS is particularly useful if you have the need to develop and distribute your own business applications as it provides an optimized environment. However, you will lose some control over the configuration of the operating system and application platforms. Some line-of-business applications using SQL-based databases may operate best in a PaaS instance; however, you need to discuss best options with your vendor.

- Software-as-a-Service or SaaS – SaaS is a widely adopted model for productivity software, such as Microsoft 365, or many line-of-business applications – for example, Adobe Creative Suite, Quicken Online, SalesForce CRM, and many others. It is a fair statement that SaaS is fast becoming the most popular delivery method for software. With SaaS, you have very limited control over the software environment and no control over the operating system; however, this tradeoff equates to a very stable environment for operation.

The graphic below gives you a good visual comparison between on-premise and the various cloud solution models. Blue indicates the customer areas of responsibility and the green indicates the areas managed by the cloud service provider.

These models are intended to interoperable and tailored to the needs of your business. You may, for instance, use Microsoft 365 and Quicken Online as SaaS for your business, have an analytic dashboard from a PaaS vendor, and use IaaS to run your identity management using Active Directory. One of the strengths of cloud computing is its flexibility. Much like the fabled menu at a Chinese restaurant, you choose what you need from each column.

**Hybrid Cloud:**
some resources are located in a private cloud and others are in a public cloud and the two communicate.



***Now that we have covered what cloud is, let's spend a bit of time on what it is not and dispel some of the myths.***

**THE PUBLIC CLOUD IS INSECURE.** While there may be a very few cloud services that pay less attention to security than they should, most cloud service providers take security very seriously, for several reasons:

First, commercial cloud service providers have to meet very strict regulatory and compliance standards in order to be able to provide services to governmental, financial, healthcare, and other industries that are highly regulated. The benefit is, of course, that all customers have access to these highly secured environments at no additional cost. In fact, it would be fair to say that cloud-based servers are probably built more securely than what you could typically afford to build yourself.

- Cloud storage is set up to encrypt data, both at-rest and in-transit.
- Auditing and monitoring are more robust.
- Replication of your entire cloud environment is native to Azure. This ensures high availability and resilience. By design, each Azure VM and environment is actively replicated three times to minimize downtime (99.9% uptime guarantee at the base SLA).
    - Geo-replication (replicating to different geographic regions or even countries) is optional, but will have additional costs.
- Identity and Access management, including single sign-on (SSO), is a readily available option in Azure.
- Basic firewalling in built-in to cloud services and full-featured firewall appliances are available. Networks Plus uses the Watchguard virtual firewall appliance as part of the default design to provide a more complete set of features and rules.

Interested in Azure's specific security measures? Check out the links below:

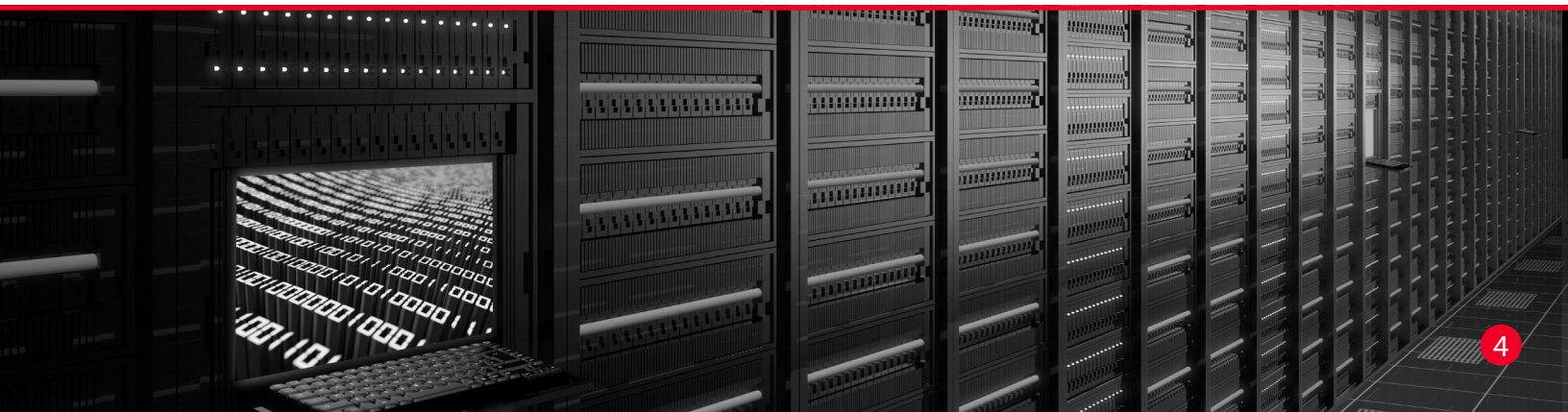
- Check out other Azure security features here: https://azure.microsoft.com/en-us/overview/security/
- Check out Azure compliance here: https://docs.microsoft.com/en-us/microsoft-365/compliance/offering-home?view=o365-worldwide

**THE CLOUD IS AN 'IT JOB KILLER'** . Nothing could be further from the truth. IT skills will have to be updated to reflect the change in architecture, but operations in the cloud do not reduce the need for skilled IT personnel to operate and maintain your environment.

**THE CLOUD IS AN AUTOMATIC MONEY SAVER.** A properly designed, implemented, and optimized cloud solution can be extraordinarily cost-efficient, especially as it is usage-based, but to realize the best yield from a cloud migration you will need to examine and adjust business processes accordingly.

**THE CLOUD SHOULD BE USED FOR EVERYTHING.** In a word, 'No.' The cloud is just another IT resource that should be incorporated, if it makes sense for your business. That being said, cloud computing could have a place in almost every business.

**WE AREN'T BIG ENOUGH TO MOVE TO THE CLOUD.** Without a doubt, this simply isn't true. All businesses can benefit from adopting cloud computing. Whether it is only adopting Microsoft 365, a full-blown cloud infrastructure, or anything in-between, the benefits of cloud computing are worth the effort.



# BENEFITS OF CLOUD COMPUTING

***While it is very easy to get lost in the hype of cloud, not to mention the alphabet soup of acronyms and tech-speak, cloud computing has some real benefits for your business which you should not overlook.***

**SECURITY**

As discussed previously, cloud providers take security seriously. Building infrastructure, monitoring, and threat hunting at an appropriate security level is well beyond the means of all but the largest enterprises. However, it must be mentioned here that the complete security for your cloud workloads is a shared responsibility! The cloud provider works diligently to secure their infrastructure and bandwidth pipelines, but it is the customer's job to ensure that they have solid cybersecurity practices for their data and users.

**COMPLIANCE**

If you operate a regulated business, you already know how incredibly time-consuming and expensive it is to build a compliant infrastructure, not to mention the constant tinkering (and spending) that you have to do as the regulations change. Now imagine being able to rent all of that compliant infrastructure, a world where all of the expensive updates and maintenance are done for you. That is the cloud with Azure.

**MOBILITY**

The modern business environment is radically different than it was no more than 5 years ago. A simple, locally-based business isn't just simple and local any longer. Your customers don't just come from advertising in the nearest newspaper or from a phone book – they find you on the web. You don't just have staff working at a desk in your building – you have salespeople on the move and staff working from a home office. Cloud computing is tailor-made for a mobile workforce and reaching customers outside of your traditional market.

**FLEXIBILITY**

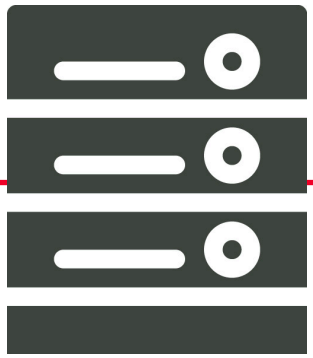
Having a flexible infrastructure is something that would never occur to most businesses – right up to the time that you really need some extra memory or processor to handle those annual reports, need to run some analysis for auditors, have a sale on your website that is more successful than you anticipated, or any number of incidents where you just need more power than you have on tap. Adding hardware to your current infrastructure isn't quick, cheap, or easy and once you have it, it will just sit idle until the next big demand comes around. In other words, you have made an investment in overhead which largely pays little to no dividend to the bottom line. Cloud computing, on the other hand, can be ramped up during times of high demand and reduced when the workload is light – you pay for what you use, when you use it. No more investment in excess capacity that sits idle.

**DISASTER RECOVERY/BUSINESS CONTINUITY**

At the very least, you should have some cloud component as part of your DR/BC plan already, whether that is using a video meeting platform as part of your DR communication plan or using a backup solution that replicates to the cloud. If not, you have not prepared your business as fully as you can. Fortunately, cloud computing can take a lot of that burden since Azure has hundreds of data centers worldwide, is supported by a purpose-built fiber network owned entirely by Microsoft, and is guaranteed at 99.9% (or higher) uptime.

# COMPARING CLOUD TO ON-PREMISE

***Much of the reticence regarding cloud adoption has more to do with fear than fact. A direct comparison case study is useful to help you choose how best to plan your cloud adoption strategy.***



**We will use the following assumptions for this case study:**

- One server to handle Active Directory
- One server to act as a file server, be a secondary AD server, and run a line-of-business application (similar to QuickBooks. We will use their specifications as an example)
- ~500 GB of storage for files and LOB application
- Backup solution that can retain up to 6 months of data
- Licensing for operating systems and applications, including support agreements

This set up is intended for a small office – 25 users or less. We aren't considering workstations or productivity software as those will be required for both solutions. The business will operate from 8-5, Monday through Friday. Some items will be estimated in order to achieve proper comparison of true costs.

## BUILDING AN ON-PREMISE SOLUTION

The most cost-effective solution using the parameters above is to purchase a single server that is more robust and virtualizing it into two separate servers; in essence, building a 'private cloud' to maximize your investment.

Server hardware (based on online configuration from a major manufacture)

- Dual processors/10 core each.
- 32 GB memory
- 480 GB of available hard drive, in a RAID 5 configuration for redundancy
- Windows 2019 Server Standard, licensed for 20 cores and Hyper-V
- Next Business Day support for 3 years

**Estimated total - $5270, less taxes, installation, and security software**

Additional hardware/software

- Line-of-business application - $1100/year
- UPS - 900 VA, 10 min uptime - $830.
- Buffalo TeraStation NAS for backup – 8TB - $655
- Veeam Backup Essentials -$430/year

Additional costs

- Electricity - $33/month. Calculated at 720 hrs/month x $.0924/KwH x .495 (495W power supply in server)

| Total Estimated Cost/Month (based on 36 months) | |
|---|---|
| Server/Operating System | $147/mo. |
| Line-of-Business Application | $92/mo. |
| UPS | $23/mo. |
| Backup NAS Storage | $19/mo. |
| Veeam Backup Software | $36/mo. |
| Electricity | $33/mo. |
| **Total Monthly Cost** | **$350/mo.** |

**Note: This is an estimate of the raw cost for a basic on-premise solution which does not include any maintenance, software support, cost for depreciation, or other additions or incidentals.*

# BUILDING A CLOUD SOLUTION

Using the same assumptions, we will build a direct replacement IaaS solution in Azure. Since Azure is usage-based and we have set the hours for fictional business as M-F, 8-5, we will start the servers at 7 AM and shut them down at 6 PM in order to cover incidental time. We will also include one weekend per month at the same hours to account for additional inventory/accounting functions. Based on these additional assumptions, each server will operate for 416 hours/month. Note that servers can be backed up when they are shut down. The environment will be built in the Central US region data center.

- Active Directory Server: A2 v2 server – 2 virtual CPUs, 4 GB memory, 20 GB temporary storage @ $0.136/hour - $59/month
  - E10 Storage for AD server – 128 GB SSD - $12/month
- File/Line-of-business application server: D2 v3 server – 2 virtual CPUs, 8 GB memory, 50 GB temporary storage @$0.209/hour - $81/month
  - E20 Storage for File/App server– 512 GB SSD - $38/month
- Network and logging - $25/month
- Backup - $93/month (NOTE: this based on our recommended backup schedule and retention. Costs will vary depending on your needs)
- Backup storage - $44/month
- Static IP address - $3/month
- Watchguard Basic Virtual Firewall - $73/month

**Total monthly estimate for Azure servers and Backup - $428/month**

**Line-of-Business application - $92/month**

**Total estimated monthly cost for cloud- $520/month***

**It should be noted that the virtual machines calculated here are based on direct comparison to a physical server configuration. VM costs will vary based on determining the actual resource utilization in your current environment.*

## FEATURE COMPARISON

While there seem to be a wide gap in the costs, there are features and value each solution can provide to your business which merit consideration.

| Azure | On-Premise |
|---|---|
| High-availability and redundancy via replication of environment. | No replication as designed. An HA solution would require doubling of hardware and specialized software. Replication would require a locating additional hardware in secondary location and connectivity. |
| 99.9% or greater uptime. | Uptime of 10 minutes on battery backup. |
| Highly secure infrastructure and backups. | Additional hardware/software would need to be added to achieve the same level of security. |
| Easy to increase or decrease infrastructure, based on need, with limited downtime. | Increase of available resources requires ordering the materials and planned outages to implement. |
| Monthly billing based on usage as an Operational Expense. Unlimited life cycle. | Fixed cost to be depreciated as a Capital Expense. Life cycle 5-7 years. |
| Reliable internet bandwidth is required for operation. | Internet bandwidth only required for remote access or extending services to the outside world (i.e. websites, vendor connectivity). |
| Usage based cost for data egress from Azure. | No data egress cost. |

# CONCLUSIONS

The modern business environment has evolved well beyond just the traditional brick-and-mortar storefront. Even if your business doesn't operate beyond a few cities or counties to provide your goods and services, your customers still expect a web presence, your vendors will want to connect with you, and you and perhaps your staff will need to work remotely periodically.

On-premise solutions are still a viable option, but the cloud is a much better and more cost-effective if you are looking to:

- Increase your security measures
- Meet compliance standards
- Complete a disaster recovery and business continuity plan
- Support an increasingly mobile workforce
- Limit capital expenditures for software, hardware, and maintenance

**Contact our business consulting team to discuss how cloud may fit into your business.**

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