



A GUIDE TO THE CLOUD CAREER OPPORTUNITY FOR IT PROS

AND TO THE TRAINING THAT WILL HELP YOU TO SEIZE IT



Cloud computing has already started to change the way organisations think about their approach to IT. A new paradigm is emerging: one that is flexible, cost-effective and supports tactical and strategic objectives within the business. Cloud computing clears the path for innovation and agility in provision of IT services.

But the big changes have barely started.

Executive Summary

Currently, organisations that have fully embraced and implemented a cloud strategy are still in the minority. Only 3 per cent of CIOs have the majority of IT running in the cloud or on SaaS technologies, but over the next four years CIOs expect this number to increase to 43 per cent.*

Although the thinking behind cloud computing is in many ways revolutionary, the process of change within the IT organisation is likely to be evolutionary. And although cloud purists dream of a world where every instance of computing and storage will take place in the cloud, the reality is that a hybrid cloud/on-premise model will emerge as the new reality for many organisations.

For IT professionals considering their own status in a rapidly changing environment, the implications are profound. In a recent Microsoft survey of IT professionals, 59 per cent of respondents said that "they are just beginning to familiarise themselves with the cloud."

Put bluntly, the role of the IT professional is about to be transformed, demanding a new set of technical and managerial skills, blurring the lines between business and technical decision making and placing IT much closer to the heart of business strategy.

Whether this change represents a threat or an opportunity will be largely determined by each individual IT professional's readiness to acquire new skills and knowledge. In any event, the fact is this: maintaining the status quo is not an option.

This paper aims to set out a broad outline of the ways in which the role of the IT professional will change over the next few years, the skills and training required to adapt to these changes, and an overview of the ways in which new Microsoft certification programs will help to make this transition.

'Over the next five years, CIOs expect dramatic changes in IT as they adopt new technologies and raise their contribution to competitive advantage. Leaders will implement new infrastructure technologies to achieve increased efficiency and to redirect IT resources to create greater business impact. Pursuit of that leadership agenda will raise complex issues ranging from re-imagining IT's role in their organisation to the creative destruction necessary to break old practices and redeploy resources to new initiatives.'

Mark McDonald, group vice president and head of research for Gartner Executive Programs

* Source: Gartner Executive Programs 2011 CIO Agenda survey



'The cloud is coming, and many IT professionals are looking at how they can best prepare their skills for the impending growth of cloud presence amongst their customers. Fortunately, many of the skills that IT professionals are earning today apply very well to the cloud. IT professionals will also seek to grow their skills, in areas such as planning and design, which will be increasingly important as many of the implementation and operation functions are done in the back end, in the cloud'

**Don Field, Senior Director,
Microsoft Certification Program**

How the cloud will change the IT pro skills landscape

The cloud is an emerging phenomenon. Currently, the focus is on the service delivery model for Infrastructure and Software as Services. But with projected increases in uptake of Platform as a Service (PaaS), there will be a change in the basic architecture of IT service delivery. Two salient consequences of this shift will define the future roles of people working in IT:

1. There will be an increasing need for the big picture view and more breadth of knowledge of the wider business.
2. IT will become more of a value add - or enabler - than a cost to business processes. The role of the IT professional will become more about insight and understanding leading to enablement, and less about making things work. IT professionals will focus more on advising and managing than implementing, and so will need to develop more business analyst and cost analyst skills.

Skill sets that will decline in importance over time will be:

- Application engineers, especially for "commoditised" applications such as E-mail.
- System engineers who provision and maintain hardware.

The most important opportunities for specific skills development are:

- **Systems architecture** – because cloud architecture is so much more flexible and scalable, a whole new way of thinking will emerge in application design, which will leverage the power of the cloud and minimise the potential for problems.

- **Networking and infrastructure** – this is an area that will become more important as more and more processes rely on communication with the cloud.
- **Integration** – since many people are simply using SaaS to offload specific workloads or bring in a functionality without bringing in the expertise to support it, the impact on learning is low. But in situations where there is a true hybrid data centre being created, integration challenges can be significant and are a key area for reactive learning.

Since migrations typically start small with a "test bed" application, learn what issues there are and then proceed (slowly) to larger scale roll-outs. This process promotes a learn- as-you-go, reactive model.

What you need to know:

Up-skilling for the cloud can be envisaged in four distinct tiers:

- General understanding of the cloud
- Understanding the offerings of your providers
- Implementation specifics
- Non-technical needs

1. Understanding the Cloud

It is important to think about the three core offerings of the cloud and how skill sets will need to change to accommodate them

1. Infrastructure as a Service

This is primarily a simplification and agility initiative for IT, which will result in a generalist profile in IT – we will see fewer specialist system and application engineers, and more people wearing multiple hats. The simplification of processes via management consoles and automation of processes will mean that managers will need a basic knowledge about a variety of workloads and provision without the need for detailed understanding.

This aspect of cloud computing requires continued learning, most importantly around how to manage infrastructure and analyse cost in a virtualised environment. Knowing how much it costs to run a Virtual Machine (VM), charge it to the business and compare with the public cloud, for instance, will be key.

2. Platform as a Service

Ultimately, PaaS will make the IT pro's job more interesting. Currently the role is 70:30 routine day-to-day maintenance to strategic activity. PaaS will reverse that ratio, and allow the IT pro to focus more on management of their overall IT strategy. For many organisations, the future is going to be hybrid cloud/ on-premise, so the IT pro will have to focus increasingly on workflow and application management and integration technologies.

Additionally, because the total application set in any given organisation has traditionally been restricted due to the cost and risk of developing and deploying new applications, and because the cloud removes much of this cost and risk, the IT pro role will expand to accommodate a much larger and more heterogeneous portfolio, with more scope to deliver value to the business by introducing new applications and processes.

3. Software as a Service

SaaS allows organisations to offload minor, non-strategic workloads and focus on higher value output.

Most commonly used for specific workload applications where cloud provides a simple, easy solution that reduces burden on IT staff – SPAM monitoring, E-mail archive etc, it can extend to larger workloads that have become proven and “commoditised” in the cloud, such as E-mail.

Minimal learning or training is required for either IT staff or end users. However the one key area that IT pros will need to focus is understanding connection technologies for traditional models to the cloud where a hybrid model is in place. For example, if you are making the move to Office 365, you will need to understand Active Directory Federation Services (ADFS), as well as DirSync.

2. Understanding the provider landscape

As well as understanding the overarching business benefits of the cloud, IT professionals will need to understand the technology that underpins the processes and how to best derive value from the opportunities presented by the cloud.

As IT pros evolve into business analysts and decision navigators, they will need to have extensive knowledge of the specifications of the solutions available to them, and conduct a comparison of what provider offerings include, such as:

- Do they offer IaaS or true PaaS?
- Configuration/monitoring tools?
- Ecosystem/marketplaces?
- Development tools supported?
- SLA level?
- Specific features/limitations?

Do not underestimate the weight of this level of learning – much of what people need to learn focuses on the technical specifics of the service offering, e.g. there is a 50-GB limit on a SQL Azure database – what happens if you exceed?

The landscape of Microsoft's products to review would be:

APPLICATION SOFTWARE AS A SERVICE (SaaS)	 Microsoft Office 365	 Microsoft Dynamics CRM	 Windows Intune
PLATFORM PLATFORM AS A SERVICE (PaaS)	 Windows Azure	 Microsoft SQL Azure	 Windows Azure AppFabric
INFRASTRUCTURE INFRASTRUCTURE AS A SERVICE (IaaS)	 Windows Server 2008 R2 Hyper-V	 Microsoft System Center	 Microsoft Hyper-V Cloud

Microsoft has developed a set of online resources to help IT professionals investigate and implement cloud strategies. For more information, visit <http://technet.microsoft.com/ITProcloud>



3. Implementation specifics

Technical knowledge requirements for cloud implementation

This can be grouped into 9 core knowledge areas. These are not definitive categories, and there is some overlap. But for the purposes of setting out broad education and training requirements, they offer a comprehensive overview.

Architecting and development

- a. Architecting for multi-tenancy
- b. Flexibility to scale
- c. Service Oriented Architecture (SOA)
- d. Stateless servers
- e. "Web 2.0" languages/tools (especially for developers using older languages)

Data/storage

- a. Aligning multiple processes to storage while maintaining integrity of data – order of data packets preserved, etc
- b. Clustering
- c. Defining permission for access and actions
- d. Distributed databases/hub and spoke
- e. How to securely expose data to third party
- f. Harvesting/exposing metadata
- g. Mirroring data, replication, multi-master setups
- h. Open data format
- i. Processing data in the cloud – proximity of data to computation workload
- j. Relationship of data location to latency
- k. Token-based data access

Elasticity/scaling

- a. Effects of multiple images per machine
- b. Strategy for elasticity – scale horizontally or vertically?
- c. What is the reality of dynamic scaling? Even with dynamic scaling there is a lag of, say, 10 minutes. How do you manage that?
- d. Coordinating processes
- e. Scheduling resources – scale up 9-5

Integration

- a. Data validation
- b. Dependencies between internal and external systems
- c. Effectively integrating workflows
- d. Firewall management to allow cloud servers to communicate with data centre
- e. Framework for governance – defining what responsibilities lie with the cloud provider vs. company
- f. Maintaining single sign-on
- g. Reliability of communications
- h. Synchronisation of data

Monitoring and control functions

- a. Assessing utilisation between business units/branches
- b. Modelling demand on existing routers/switches to ensure it can handle new loads
- c. Network traffic and loads
- d. How much control to set permissions/authorisations
- e. Detecting/controlling runaway instances

Networking/communication

- a. The networking layer is a strong area for skills development and learning
- b. Audit and assess current equipment (routers)
- c. Effect of intermediate points on roundtrip delays and latencies
- d. Fibre Channel
- e. iSCSI
- f. Load balancing/resource utilisation
- g. MPLS networks
- h. Packet routing to improve speed or response time
- i. SANs
- j. Troubleshooting connectivity/blocking

Security and compliance issues

- a. Active directory management – and where does it belong, internally or with cloud provider?
- b. Authenticating outside users
- c. Authenticating yourself to outside partners
- d. Ensuring in line with geographic data privacy or SOX requirements
- e. Handling intrusions, such as locating and handling Zombies in virtualised environment
- f. How to conduct a security audit

Virtualisation

- a. Configuration of VMs
- b. VM management (handling runaway instances, etc.)
- c. How to isolate problems in a highly virtualised environment
- d. Hypervisors – contrast and compare
- e. Partitioning



'As organisations transition to the cloud (particularly medium and large sized organisations) they are not likely to go all at once but might move one or another function to the cloud while continuing to have on premise applications for a number of different functions they perform. Integration skills between cloud and on premise will be growing areas of importance for IT professionals.'

**Don Field, Senior Director,
Microsoft Certification Program**

4. Non-technical training needs

Some areas to consider in the wider context of cloud with your organisation:

- **Understand the technologies that power cloud.** There are some fundamentals that you really need to grasp before you can understand cloud in its entirety. Fortunately, these technologies are ones that you are probably already familiar with, the cornerstone of which is virtualisation. Everything in the cloud is virtual. So you need to know what it means to divorce software from hardware.

Contingent to this is a requirement to understand the costs differentials between deploying in the cloud versus your own data centre. For example, if you have data stored in the cloud that has not been accessed for six months, you need to pay for that storage. So you should consider archiving the data locally or deleting altogether. Gaining this level of understanding will revolutionise what you do and help clear clutter.
- **Know what your business needs to measure.** Knowing what's important to your business and how the technology marries up to that is critically important. You need to be fully aware of what they need and what's important to them so that you can ensure it happens. With Azure you have use of an API to control scale based on the needs of the application. Measurement and monitoring tied to business knowledge will allow you to deliver higher levels of value, because you're no longer spending time keeping systems running – you're now helping the business to generate more money by matching demand curves.
- **Understand how to govern the cloud.** Increasingly, expertise will be needed in the area of requirements analysis, inviting bids for cloud solutions and monitoring SLA compliance. One could argue that these activities fall outside the scope of the "cloud" IT pro, but it's highly likely that these skills will become increasingly important for them to acquire.

Some additional questions to answer around handling of customer data, and when to deploy cloud solutions and when to stay on-premise:

- Can I get an assurance of where my data is held?
- Can I get an assurance around uptime?
- Can I get an assurance about the practices that the provider uses in their data centre?
- Can I find out about who's auditing a provider?
- Can I find out about what testing and certification a provider has provided and supports?
- Can I find out how the provider is trying to move the industry and regulation forward for its customers?
- Can I find out how to exit the contract?
- Do they give me time to read the contract?
- Wait there was a contract?
- Have we built applications that adhere to our own practices?
- Have we deployed the application in a compliant way?
- What's the update process, where are the patches, what's the security like?

While not necessarily technical, this is vital knowledge about how to align IT to business needs, underlining the need for IT pros to develop skills in business and cost analysis.

In summary, there will be an increasing need for IT pros to have more business skills in these areas:

- Communication skills
- How to be a business analyst
- Providing cost analysis
- Defining customer needs
- Architecting apps to maximise appeal/minimise customisation requirements
- Understanding competitive landscape and market trends in order to provide strategic counsel
- Managing compliance issues
- Reviewing/monitoring SLA performance.

'The pace of change will definitely increase with the cloud. There are changes in the IT industry that have caused major shifts in the way that people's skills have developed... The good thing for IT professionals, is that every single one of those transitions has provided major opportunities to develop new skills, to build those skills to be closer to the fundamental needs of the business and organisations for which they work and to demonstrate increased value at every step.'

**Don Field, Senior Director,
Microsoft Certification Program**

Microsoft Virtual Academy

The [Microsoft Virtual Academy](#) (MVA) offers no-cost, easy-access training for IT professionals who want to get ahead in cloud computing. Developed by leading experts in this field, MVA modules are designed to develop the skills and knowledge required to become a cloud specialist.

MVA courses available now include:

- Introduction to SCVMM, Architecture & setup
- Creating VMs, Template & Resources in VMM
- Managing Windows Azure
- SQL Azure Security
- Identity & Access
- Data security and cryptography

More courses will be added on a monthly basis, including more Private Cloud tracks and Office 365.

MVA provides real-life deployment scenarios and cloud computing technologies and tools.

What training and certification is available from Microsoft?

Microsoft cloud services: Training and Certification

Cloud technology creates new opportunities and job roles, but it also impacts current ones. Over the next year, Microsoft Learning will introduce new certifications on Microsoft cloud services and will update many of the current certifications to include cloud-related skills. We'll provide training for these cloud computing offerings through Official Microsoft Learning Products, including Microsoft Press books, Microsoft Official Courses, and Official Microsoft E-Learning.

The evolution from the traditional datacentre to the private and public cloud will impact IT skills by reducing the emphasis on some traditional skills, shifting the emphasis to emerging technology and design skills and introducing potential new skill opportunities.

We recommend that you follow this three pronged strategy to build your skills:

- **Obtain and leverage existing core IT pro skills and certifications** – these are still valid now and will be for a few years. This platform will help you make the move towards cloud focused skills in the future
- **Enhance your core skills and certifications** – developing key online skills that support and extend existing technologies into the cloud for example Exchange and SharePoint
- **Develop new skills and certifications** – to support new cloud services technologies e.g. Windows Azure and Virtualisation.

You can see a full list of Cloud Certification paths over the next few pages or view the full list [here](#).



The banner features the MVA logo (mva Microsoft Virtual Academy) and the Microsoft logo in the top left. The main text reads 'Get help elevating your career with Microsoft Virtual Academy'. At the bottom, it says 'REGISTER TODAY' followed by a large blue arrow pointing right, and 'LEARN'.

	Goal	Certification paths	Certification paths	Required exams	Get training
Platform as a service	Build your skills	MCPD: Web Developer 4 Earning the MCPD: Web Developer 4 certification will help you gain core web development skills and better prepare you to develop for the cloud. You are not required to pursue the MCPD: Windows Azure Developer certification.	Available now	Exam 70-513 Exam 70-515 Exam 70-516 Exam 70-519	Microsoft Visual Studio
		Or			
		MCPD: Windows Developer 4 Earning the MCPD: Windows Developer 4 certification will help you gain core Windows development skills and better prepare you to develop applications by using cloud technology. You are not required to pursue the MCPD: Windows Azure Developer certification.	Available now	Exam 70-511 Exam 70-513 Exam 70-516 Exam 70-518	Microsoft Visual Studio
	Obtain new skills	MCPD: Windows Azure Developer Show employers and clients that you are ready to support the move to cloud services by earning the MCPD: Windows Azure Developer certification. This certification helps validate your ability to design, build, and deploy cloud-based applications that will be hosted on the Windows Azure platform.	New! Available now	Exam 70-513 Exam 70-516 Exam 70-583	Windows Azure
Infrastructure as a service	Build your skills	MCITP: Server Administrator Earning the MCITP: Server Administrator certification will help you gain core Windows Server skills and better prepare you to support a cloud infrastructure. It is not required that you pursue the MCITP: Virtualization Administrator certification.	Available now	Exam 70-640 Exam 70-642 Exam 70-646	Windows Server
	Obtain new skills	MCITP: Virtualization Administrator Get ready for "private cloud" by earning your MCITP: Virtualization Administrator certification. This certification helps validate your knowledge and skills in designing and deploying virtualization solutions when using Windows Server 2008 R2 in an enterprise organization.	Available now	Exam 70-669 Exam 70-693 <i>plus either</i> Exam 70-659 <i>or</i> Exam 70-652	Microsoft Virtualisation

	Goal	Certification paths	Certification paths	Required exams	Get training	
Software as a service	Build your skills	MCITP: Enterprise Messaging Administrator 2010 ¹ Demonstrate your professional messaging expertise by earning the MCITP: Enterprise Messaging Administrator certification. Updates that include cloud-related skills will be available soon. Azure Developer certification.	Available now- updates coming soon	Exam 70-662 Exam 70-663	Microsoft Exchange Server	
		<i>Or</i>				
		MCITP: SharePoint Administrator 2010 ² Demonstrate your Microsoft SharePoint 2010 administration skills. Updates will include cloud-related skills.	Available now- updates coming soon	Exam 70-667 Exam 70-668	Microsoft SharePoint	
		<i>Or</i>				
	Dynamics CRM 2011 certifications ³ New certifications will cover relevant skills for both cloud and on-premise implementations of Microsoft Dynamics CRM 2011. Certifications include Microsoft Dynamics CRM 2011: Applications, and Microsoft Dynamics 2011: Customization and Configuration.	Available soon	Visit: Customer support site or Partner site	Microsoft Dynamics CRM		
Obtain new skills	MCITP: Lync Server 2010 Administrator ⁴ This certification helps show that you have the skills to deploy and configure Microsoft Lync Server 2010, an integral part of the Microsoft software as a service offering, called Microsoft Office 365.	Coming soon	Exam 70-664 and Exam 70-665	Course 10533A <hr/> Course 10534A		

¹This certification will be updated to include Microsoft cloud-related skills in the next several months.

²This certification will be updated to include cloud-related skills in the next year.

³These certifications are scheduled to be available in the next several months. This link is only accessible to Microsoft Dynamics CRM customers and partners.

⁴This certification is scheduled to be available in late March 2011. The courses are scheduled to be available in late April 2011. Candidates can begin preparing by using the exam preparation guides.

Conclusion

According to the technology job search site Dice.com, the number of adverts for jobs focused on cloud computing grew by more than 300 per cent last year. And according to CIO's Virtualisation and Cloud Computing Hiring Outlook for 2011, virtualisation and cloud computing are near the top of the list of the most hotly pursued skills.

Many of the skills, such as server migration, security, application development, storage management, and business process management come into play, according to CIO. And that means cross-training. Data Centre managers will adapt and develop new skills such as lifecycle management and services management.

And it pays to be early to the game. In its IT Career Guide, CIO notes that IT pros who view their profession as a dead end, cite the usual litany of problems, from offshoring to the lack of appreciation and absence of work life balance, while those who are optimistic about their IT careers see the need for IT pros to be more well-rounded to respond to cloud computing, which also makes it easier to find positions in other business units.

As IT transforms, the time to begin your own transformation is now.

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