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WHITE PAPER

Climate Change: Cloud's Impact on IT Organizations and Staffing

Sponsored by: Microsoft

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Introduction

While cloud computing[1] is still emerging as a computing style, it has already begun changing how IT delivers economic value to countries, industries, and businesses. Adoption of cloud technologies is as disruptive for existing IT approaches as it is for business and existing revenue models. In some ways, it's the climate change of business opportunity: Cloud will cause the melting of barriers to IT innovation and adoption, which will cause extreme and unpredictable competition that comes from agility, and will also likely result in the rising sea level of business value and opportunity.

For four years, IDC has been estimating the economic impact of public IT cloud services and the revenue and potential jobs driven by that innovation. The continued innovation in cloud computing represents radical changes to work practices but also will require business and IT professionals to learn and leverage new skill sets. The changes will be worth it. Because cloud computing comes with unique economic leverage, IDC estimates that in 2011 alone, IT cloud services helped organizations of all sizes and all vertical sectors around the world generate $400 billion in economic benefit. Additionally, IDC estimates that cloud helped drive 1.5 million new jobs in 2011.

This research expands that analysis to estimate the impact of cloud computing on the internal IT organization. This white paper, commissioned by Microsoft, examines the impact cloud computing will have on IT employment around the world. It follows on research IDC has conducted on the economic impact of cloud computing since 2009 and the economic impact of IT since 2002.

Economic Impact of Cloud Computing — Jobs

Cloud computing comes in many forms, from the use of third-party resources to store data, called the "public cloud," to delivery of IT services within an enterprise based on virtualized infrastructure, self-configuration, and automated provisioning, called the "private cloud." Cloud computing also comes in a wide range of "hybrid" offerings. The use of the term "cloud" in this paper refers to public, private, and hybrid clouds. Cloud-related employment or skills refers to advanced or specialized skills supporting all cloud offerings and the key technologies that enable cloud infrastructure.

[1] *Cloud Computing's Role in Job Creation,* IDC #233532, March 2012

The primary benefit of cloud is that it frees up resources for enterprises to use in other ways and lowers the cost of many IT functions. When properly applied, a relatively small investment in innovative, flexible, and aligned IT spending "in the cloud" can be leveraged into a significant return in business revenue.

For this document, IDC was interested in understanding the structural changes that "cloud computing" will have on staffing the IT organization. We were curious:

- Our previous research identified a broad business value of increased revenue from the IT innovation enabled by cloud of up to $1.1 trillion a year by 2015. What would happen to the IT organizations in those enterprises?
- Our previous research also estimated that leveraging public and private IT cloud services might generate a capacity to increase overall employment by nearly 14 million jobs worldwide by 2015. How many of those jobs would be in IT? What would the new mix of roles in IT look like?

To answer these questions, we examined more than 600 organizations around the world to expand our previous model to focus on the jobs within the IT organization.

Impact on IT Organizations

If the basic two questions for this research are *How will "cloud" impact IT organizations?* and *How will cloud impact IT employment?*, obvious corollaries would be *Are IT organizations "ready" to adopt public or private cloud services?* and *Are IT workers "ready" to work in a "cloud-enabled" world?*

Most agree that cloud computing could become the key delivery model for computing by 2030. In this research, we found that more than half of enterprises worldwide felt "cloud computing" was a high IT priority. Additionally, almost two-thirds of enterprises are planning, implementing, or using cloud computing in some fashion. However, more than three-quarters of enterprises have security, access, or data control concerns with the public or private implementation of cloud computing.

We also found that nearly every IT organization is seeking some type of cloud-enabling capability — virtualization, performance monitoring, service management, provisioning, performance optimization, or automation — yet IT hiring managers report that the biggest reason they fail to fill open requisitions for cloud-related IT jobs is the candidates' lack of sufficient experience, training, or certification. Simply put, the workforce isn't ready.

Needed Cloud Skills Will Grow at Six Times the Rate of IT Skills Overall

In general, shortfalls in available talent in IT are temporary, caused by a rapidly expanding sector or related to a specific geographic area. However, for cloud computing, the availability of skilled IT workers will be a persistent and pervasive challenge.

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"Skill shortage" is usually defined as when a firm's existing staff does not have the skills to perform a task effectively, and it is subsequently compounded by recruitment difficulty hiring those necessary skills.[2]

When hiring managers are looking for familiar skill sets, even an ambitious process is straightforward: Identify the current workers who exemplify the skills, attitudes, and behaviors the enterprise seeks to replicate and build the recruiting plan to find people who fit that bill or have the clear potential to emulate those workers.

When hiring managers are looking for candidates with a new skill set, especially skills in technical areas where success is vital to organizational success, the challenge is greater; there is no internal skill model to follow. There might not even be an external model to follow. When building or acquiring new skill sets, employers most often rely on a trusted third party to properly prepare a candidate. Sometimes that third party is another enterprise, a competitor, a supplier, or even a client. However, early adopters rely on training and, in some cases, certification of candidates to be assured of relevant competence and sufficient capability.

The U.S. Bureau of Labor Statistics estimates that for various IT jobs, the average growth in employment will be between 1.1% and 2.7% per year through 2020 (see Table 1). The growth picture is somewhat better outside the United States. IDC estimates that the overall number of IT positions in end-user organizations worldwide will grow at a 4.3% CAGR between 2011 and 2015 and reach 29.3 million in 2015.

However, cloud-related skills represent virtually all of the growth opportunities in IT worldwide and will grow by 26% annually through 2015. IDC believes there could be as many as 7 million cloud-related jobs in IT worldwide by 2015 (see Figure 1).

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TABLE 1

Growth Estimates for Select U.S. IT Job Categories, 2010–2020

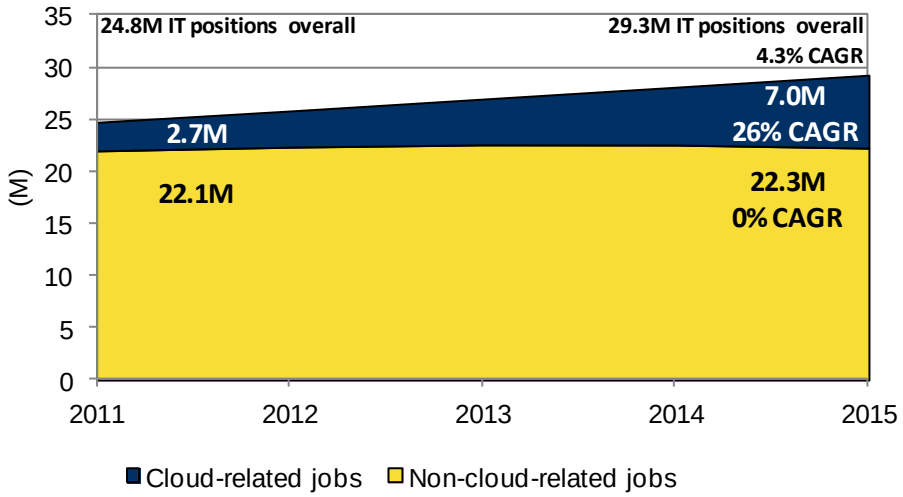
Occupation Category	Growth in Employment CAGR (2010–2020)
Computer and information research scientists	1.8
Computer programmers	1.1
Computer support specialists	1.7
Computer systems analysts	2.0
Database administrators	2.7
Information security analysts, Web developers, and computer network architects	2.0
Network and computer systems administrators	2.5
Software developers	2.7

Source: U.S. Bureau of Labor Statistics, 2012 (http://www.bls.gov/ooh/computer-and-information-technology/home.htm)

[2] (U.K.) Training Agency (1990), "Labour Market and Skill Trends 1991/1992," Employment Department

FIGURE 1

Worldwide IT Jobs, 2011–2015



Note: The figure breaks out IT jobs into cloud-related and non-cloud-related categories and highlights data for year-end 2011 and 2015.

Source: IDC's Cloud Employment Model, 2012

Cloud Roles by Major Region

The distribution of cloud-related jobs by region is a mix of employment by region crossed by investment in IT cloud services by region. The dynamics by major region are as follows:

- North America (defined by IDC as the United States and Canada) is driven by the high adoption rate of IT cloud services in the United States. According to IDC's regional forecasts, the United States accounted for 62% of worldwide spending for public IT cloud services last year, compared with 35% of worldwide IT spending in general. Canada, on the other hand, will be a much slower adopter of public IT cloud services but a more aggressive adopter of private IT cloud services. Coming from a smaller base, though, cloud-generated jobs will grow 30% faster in Canada than in the United States. By the end of 2015, there will be about 2.7 million cloud-related IT jobs in North America after growing about 22% per year from 2012.

- EMEA is a complex mix of developed and emerging countries. Last year, EMEA's spending on public IT cloud services was only about 40% of North America's, but its investment in private cloud was equal to or more than that of North America. The transition from legacy computing models to cloud-enabled models will be strongly influenced by the economic recovery, but we anticipate that EMEA's move to the "private cloud," which was more aggressive than that of North America, will compensate for the slower adoption of public cloud and result in a similar growth in cloud-related IT jobs in EMEA. We expect cloud-related IT jobs to grow by 24% per year to about 1.4 million in EMEA by 2015.

- Asia/Pacific will adopt private IT cloud services more aggressively than either EMEA or North America. Two factors strongly impact cloud-related IT job creation in the region: (1) public infrastructure challenges will help spur investment in private IT cloud services that will increase cloud-related jobs, and (2) in such an emerging market, spending on IT cloud services will be subject to less "legacy drag" than in developed regions. Of course, the primary reason for such high job numbers is the immense IT workforce in the region. Cloud-related IT jobs will grow at 32% per year to more than 2.3 million in Asia/Pacific by the end of 2015.

Figure 2 compares the regions in terms of total cloud-related jobs at year-end 2015.

Interestingly, more than 40% of new cloud-related jobs will be in the emerging markets of Latin America, Central and Eastern Europe, Middle East and Africa, and Asia/Pacific (outside of Japan, Australia, and New Zealand). Cloud-related jobs in those "emerging markets" will grow at more than 34% annually between 2011 and 2015.

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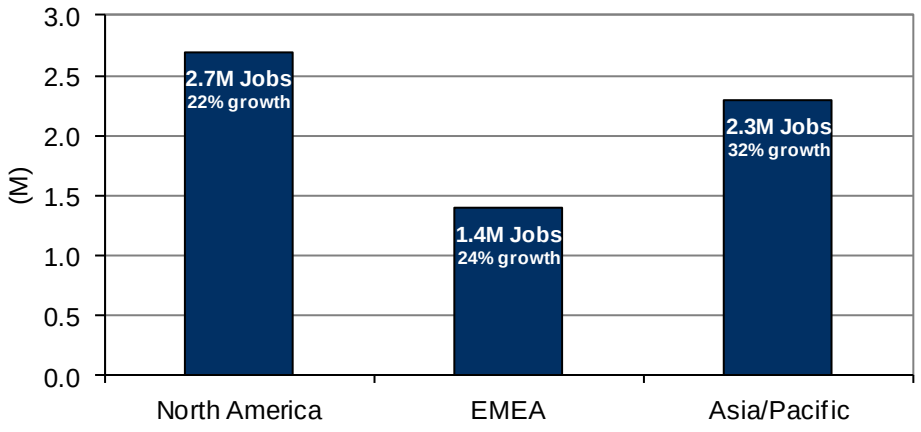
FIGURE 2

Worldwide Cloud-Related Jobs by Region at Year-End 2015



Source: IDC's Cloud Employment Model, 2012

Critical Skills for Cloud Computing

Cloud computing is a complex environment with a variety of enabling technologies. Most organizations will need technical proficiency and even expert proficiency in a wide range of these technologies to be successful. However, cloud computing is more than simply a technical paradigm: At its most beneficial, cloud computing reflects a fundamental shift in the relationship between the business and the consumption of IT.

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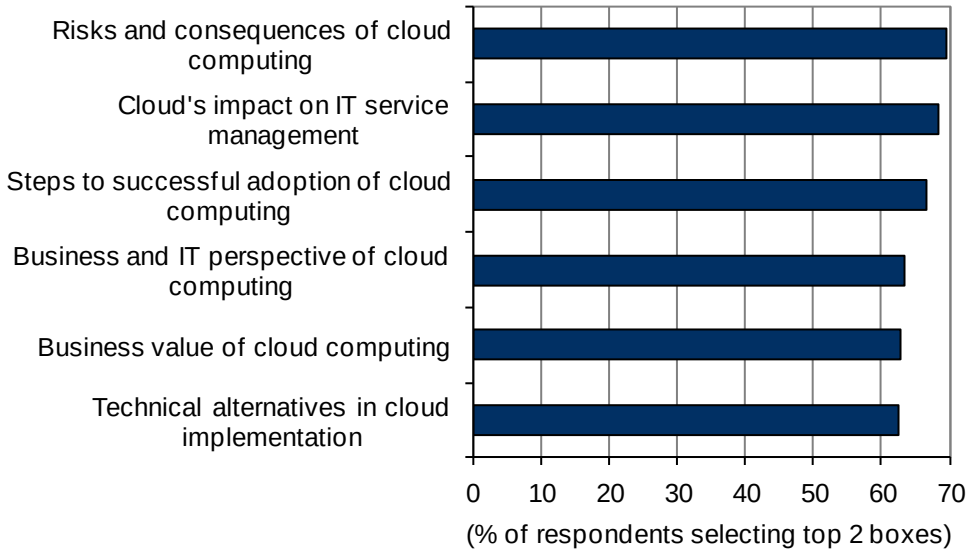
This new relationship requires the IT organization to better understand the business requirements and the intersection of business activities and the supporting technologies. IT managers who are hiring for cloud-related jobs find that understanding the relationship between cloud computing and other activities, such as service management, business continuity, and even the business value of cloud, is as important as understanding the specific technologies being leveraged (see Figure 3).

FIGURE 3

Essential "Cloud-Related" Skills

Q. For the following skills/competencies, please indicate how important each is to your company in adopting the right amount of cloud services.



n = 528

Source: IDC's Cloud Skills Gap Survey, 2012

Cloud Capabilities by Job Role

As the broader skills listed previously are applied to specific job roles, it becomes clear that there is no area of the IT organization that will be unaffected by a transition to cloud computing.

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- **Management functions.** Internal advocates for cloud computing must be able to articulate the business value and opportunity of cloud computing and select alternatives when appropriate. This clearly expands on a trend of monitoring the cost and business contribution of IT and ensuring alignment between financial and resource investment in cloud-related technologies and business outcomes. Similar to senior IT leaders in the legacy environment, vendor negotiation capability and a clear vision of the intended business goal will be essential for management functions in a cloud-enabled IT organization.

- **Project and program managers.** Project management skills are essential in all IT organizations. Project management involves alignment of resources and coordinating activities to ensure that specific activities, project milestones, and intended outcomes are accomplished. Transitioning to a cloud-enabled IT environment and maintaining a well-aligned cloud computing platform implies an even more dynamic, project-oriented requirement for IT organizations. Systems designed for agility and responsiveness, such as cloud and cloud-related technologies, rely more heavily on project and program managers to ensure that interdependencies are identified and accommodated.

- **Business analysts.** Also critical to effective alignment between cloud capabilities and the supported business will be a strong and articulate description of business objectives and cloud services that will enable those objectives. This requires business analysts and enterprise architects to be conversant in both the business requirements and the technical options while being aware of the key service-level requirements and even the principles of service-oriented architecture.

- **Application development and maintenance.** Cloud computing and mobile computing are both part of the same trend toward ubiquitous and unobtrusive capability. Increased expectation of "anytime, anywhere" computing will require development of services that can be accessed by any device. Demand for professionals who can build and deliver applications that reside in the cloud yet take appropriate advantage of particular device capabilities will expand.

- **IT systems and operations.** In an environment where information and computing power become an increasing part of business success, high availability will be the expected service level. As data and systems are increasingly dispersed, the integration and controlled movement of data between systems and providers will also become essential capabilities of IT organizations. Making sense of high volumes of data, including how to organize and analyze large data stores, will also be increasingly important. Also essential in IT operations is a clear understanding of the impact of IT systems on business processes. This requires a broad understanding of the systemic relationships between specific IT activities and the business activities they support.

- **Network, telecom, security, and Web management.** In addition to successful "management" of networks, telecommunication, and Web systems, successful IT organizations will need to be conversant in the vulnerabilities of both malicious and accidental activities on the performance of those systems. This will also include understanding compliance with appropriate legal, financial, and business requirements to ensure the underlying reliability of the information along with its availability.

- **Help desk and end-user support.** Implied in a cloud environment is the ubiquitous and unobtrusive availability of information and computing capability. This suggests that IT organizations must be attuned and responsive to the specific requirements of their user audiences. While end-user support is often considered a necessary evil in legacy environments, it becomes the core function of a cloud-enabled environment. At the front end, proper service-level definition will be essential. Equally important will be the ability to appropriately isolate and

diagnose trouble between an increasingly large portfolio of systems. At a higher level, analyzing the frequency or concentration of particular issues will be essential to better architecting future systems and improving support.

The job roles with the most new positions are expected to be in project and program management, IT systems and operations, and management functions overall (see Table 2).

TABLE 2

New Cloud-Related Jobs by Role, 2011–2015

	Developed Markets	Emerging Markets	Total
Management functions	428,670	366,174	794,845
IT systems and operations	361,407	269,007	630,414
Project and program managers	288,269	267,322	555,591
Help desk and end-user support	313,107	236,094	549,201
Application development and maintenance	298,235	227,594	525,829
Business analysts	266,351	236,612	502,962
Network, telecom, security, and Web management	256,793	224,618	481,411
Other	104,569	86,538	191,107
Total	2,317,401	1,913,958	4,231,359
2011–2015 CAGR (%)	22.3	34.4	26.4

Note: Developed = North America, Western Europe, Australia, New Zealand, and Japan. Emerging = Latin America, Central and Eastern Europe, Middle East and Africa, and rest of Asia/Pacific.

Source: IDC's Cloud Employment Model, 2012

Certification and Training Are Criteria for Hiring IT Professionals

Relying on technology creates dramatic growth in demand for skilled IT professionals. As cloud technology becomes more indispensable to businesses, effectively managing technology becomes essential.

This research suggests there are as many as 1.7 million open requisitions for cloud-related IT jobs worldwide in 2012. The single most important factor hiring managers cite for failing to fill those jobs is a lack of appropriately skilled candidates.

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When identifying qualified and appropriate candidates for technical jobs such as cloud, IT managers rely on a wide range of characteristics to support their decision, from interpersonal skills and enthusiasm for technology as a profession to prior experience and training. However, IT managers consistently report that while the

economy represents a challenge to filling cloud-related positions, finding applicants with the appropriate expertise, certification, or training is a much bigger issue.

Certification, training, and experience are three of the top four most important characteristics hiring managers rely on in selecting a candidate for a cloud-related job — "potential" is the most important criterion for selection. Because relatively few IT professionals are "experienced" with cloud, appropriate training and certification will play an essential role in preparing IT professionals for the evolving IT organization.

IDC's certification impact research (*Impact of Training: Functional Excellence Leads to Operational Productivity,* IDC #215762) revealed that every increase in team skill improves IT organizational performance. Therefore, hiring IT professionals with appropriate cloud certifications should also improve IT cloud service delivery and corporate performance. Because certifications often represent rigorous and meaningful bodies of knowledge and deliver tremendous value to near-term organizational success, they are effective measures of how well team members can work with specific technologies, hardware, and software. In fact, for each major cloud function we examined — development, deployment, management, support, storage, and security — the certifications increased the functional performance. Overall, each additional certification improves team performance.

IDC also found that high-performing teams spend less time deploying and fixing solutions and spend more time maintaining and improving the systems they operate. For cloud-dependent organizations, this means greater agility and greater value.

CHALLENGES/OPPORTUNITIES

In IT organizations, skill shortages related to cloud computing will require both a reskilling of existing IT professionals and a massive addition to the ranks of IT professionals worldwide. This raises the challenge of how these professionals and potential professionals will gain the necessary training and certification.

In addition to technical topics specific to a particular deployment, valuable certifications will cover an appropriate range of the essential skills described previously. Foundational certifications must stress both business and technical aspects of cloud computing and cover topics related to moving to the cloud and governance. Vendor-specific certifications will cover a broad range of topics to support building and managing integrated cloud services across environments, though hands-on labs for both training and testing will be essential to ensure practical experience from any selected certification program.

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CONCLUSION

In addition to the technical differences, cloud computing will change the fundamental relationship between the supported business and the IT organization. This will cause a change in the type and mix of IT professionals supporting the new infrastructure and even change the types of skills those professionals will need to be successful.

If cloud computing advances as we expect it will, there could be as many as 7 million cloud-related jobs in IT worldwide by 2015. However, many organizations still see significant security, access, or data control challenges with the public or private implementation of cloud computing. Additionally, while nearly every IT organization is seeking some type of cloud-enabling capability, the workforce doesn't appear to be ready.

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There is clearly not enough "experience" in the marketplace to qualify candidates for the expanding number of jobs in cloud-related roles. Therefore, training and certification will play an essential role in preparing IT professionals for the evolving IT organization. Specifically:

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- For the IT profession to be prepared for this climate change, individuals must develop along a career path that includes cloud skills and relevant certifications. This self-development will make the IT professional more desirable and create massive opportunity for career growth.
- For employers that must identify and select IT professionals in this new skill domain of cloud, it will be important to consider the relevant experience, training, and certification of the potential candidates and leverage the expertise of technology certification programs that establish a relevant and high standard for critical IT skills.
- Because few IT professionals have relevant experience, employers should rely on trusted certifications to help select appropriate candidates for cloud-related positions.

Cloud will cause a breakdown of traditional relationships between IT and the business. Cloud adoption will likely be the source of unpredictable competition and cause turbulence within IT organizations as they seek to reskill themselves and their IT professionals to support the new model. However, in the end, most enterprises will benefit from the increased level of business value and opportunity that is a result of the cloud climate change.