

## Chapter 2

# Cloud Computing—From Offline Computing to Cloud Computing

*We do not care where the information goes... Cloud has reduced complexity for us.*

—Kevin Marks, Social Media Expert at Google

*We will be surrounded by 'Cloud Computing' in the future... What you really need is 'access' to Internet without actually owning it... What you have purchased is access rather than ownership.*

—Kevin Kelly

Do you remember the movie Charlie and The Chocolate Factory?

In the movie, there was a flying machine that could move chocolate beans to each workshop to make chocolates; there were well-trained squirrels that could remove nutshells and throw bad nuts into the bin; there was also a delivery machine, which transferred chocolates directly to the TV screens of each household so that people could grab them by hand.

Fairy tales exist in a fantastic world, but technologies can turn that world into reality.

As Ruimin Zhang, CEO of Haier Group, said, “Now is the best of times as long as we can innovate; otherwise, it is the worst of times.” As cloud computing changes our lives through social media, mobile Internet and the Internet of Things, there are people who predict a revolution in the workplace, corporate management and operations.

In September 2009 as Alibaba celebrated its 10th anniversary, the company announced the establishment of a new subsidiary, “Ali Cloud”, that would focus on research and development related to cloud computing (Table 2.1).

In August 2011, Tencent announced the establishment of the East China “Cloud Computing” Center and e-Commerce Foundation. By the end of 2013, cloud computing had officially become a business unit in Tencent. Top management hoped to promote “Tencent Cloud” through Tencent’s social networks and its well-developed open platform.

**Table 2.1** BAT's involvement in the cloud computing sector

	Basic cloud	Capacity cloud	Resource cloud	Program cloud	Individual cloud	Notes
Baidu cloud	Baidu engine BAE (WEB + App), storage (high volume, CDN, large files), data pool (Relationship oriented, distribution oriented, KV). Similar to Google's application engine, Baidu Cloud conducts data repackaging on its base infrastructure and integrates high-volume-storage, big-data-processing and distributed-computing capabilities	Provides mobile developers with 14 different functions, most of which are owned exclusively by Baidu. These functions include cloud data, cloud push, LBS, multimedia (voice, face, and video), cloud crowdtesting, cloud test engine, mobile testing, end matching, translation, input, browser SDK, social modules, personal cloud storage (PCS)	Baidu has opened its traffic access capacity, user traffic base, embedded maps, POI data and user search data. Resource Cloud includes Baidu Mobile SEO, Mobile Search Alliance, Maps, Account Link and Mobile Statistics tools	Enables developers to create applications rapidly and at a low cost. Includes Frontia End Developing Framework, Clouda Development Framework, Site App Application Cloud, App Builder Light Application Cloud, Ueditor Webpage Editor and some other front-end open-source products	Still in early phase. Includes cloud storage, contact list, photo album, articles, notebook, text messages, find-my-phone, games, and health tools	Once 91 Wireless is fully integrated, capacity cloud and resource cloud services will be improved

(continued)

Table 2.1 (continued)

	Basic cloud	Capacity cloud	Resource cloud	Program cloud	Individual cloud	Notes
Alibaba Cloud	<p>Provides virtual server services similar to Amazon's, akin to the offerings of traditional servers.</p> <p>Key advantages include data storage, parallel computing and security. Includes cloud server, Load Balance, Storage (relationship-oriented database, open storage, open structural storage, open cache, offline data processing and CDN) and Cloud Engine ACE (undergoing internal testing)</p>	<p>Cloud Security Network (Cloud Shield and Testing) includes domain registration, record maintenance, and company website creation.</p> <p>Cloud market: Alibaba attracts customers capable of providing cloud services, which cover operations, rendering, site creation (online stores, group purchase and social media), and app store (applications sold to developers, such as for data analysis, cloud storage, marketing and promotion, company management and office software). Instead of demonstrating its capabilities through the cloud, Alibaba has expanded Taobao's thinking to cloud services, with a view to "establishing a leading platform of data sharing"</p>	<p>Currently there are not many services derived from Alibaba users, traffic and data processing. Customers of Taobao have not been included in the Alibaba Cloud system. Parties acquired by Alibaba have strong application capabilities and abundant developer data, but they have not been integrated, according to Alibaba's website</p>	<p>Alibaba has acquired the Phpwind Community Framework, Dubbo Development Services Framework, LVS Load Balance, and Data Pool Connecting Pool</p> <p>Druid. As an activist in China's open-source community, Alibaba has taken the traditional approach to open-source software operations, which has not yet been included into Alibaba Cloud system</p>	<p>Includes browser bookmarks, contacts, photo albums, information, voice messages and notes. Amid competition with Android, Cloud OS is more low-key, and temporarily on hold with a small market share</p>	<p>From a product perspective, the network integration with Alibaba Cloud is close to completion.</p> <p>Progress in integrating data from its allies is unknown</p>

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Table 2.1 (continued)

	Basic cloud	Capacity cloud	Resource cloud	Program cloud	Individual cloud	Notes
Tencent Cloud	Includes cloud server, flexible WEB engine, load balance, and storage (relational, NOSQL, CDN), leaving much to be desired	Includes cloud security, cloud monitoring and personal cloud storage PCS	Includes social advertisement, social communication, cloud payment, QQ login, user information, friend relationship information, value-added data and Tencent Compass (data analysis). Primarily opens up user data and social relationship; expands capability in promotions/communications and in data mining	Tencent has acquired Discus Community Framework, open-source iWeibo, JET, AlloyImage and image processing	Includes micro-cloud storage, micro-cloud photo album and micro-cloud clipboard	

Source Shanghai Institute of Digitalization and Internet Finance

In March 2012, Baidu officially announced its Baidu Cloud Strategy and signaled its intent to enter the cloud computing sector, launching Baidu Cloud for personal cloud storage and Cloud Platform for developers. In September 2012, the company unveiled plans for a cloud computing center backed by more than 10 billion yuan.

What impelled the three largest Internet Operators in China (BAT: Baidu, Alibaba and Tencent) to rush into the cloud computing? And what exactly is “the cloud”, and why is it so attractive?

## 2.1 What Is the Cloud?

As the US author Nicholas G. Carr wrote in his book *The Big Switch* (2008), if generators shaped the 20th century and gave us a new way of life, the Internet will be what shapes the 21st century, and the era of the personal computer will be replaced by the era of public computing.

Although Carr did not provide a clear definition of the cloud, he did sketch out the cloud as a type of public service. A century ago, farmers and factory directors switched from diesel generators to wall outlets to get electricity, provided by power plants to the public. Similarly, we are seeing a shift from traditional methods of information collection to the cloud for any type of data or solution. Companies providing cloud services are collecting data and performing calculations throughout their global networks day and night so that their customers, whether enterprises or institutions, can access cloud services from anywhere and at anytime, as easily as they obtain electricity. Amazon is a typical example of a cloud computing service provider.

Founded in 1995, Amazon has become the world’s most comprehensive online retailer and the second largest Internet start-up, leading the global e-Commerce industry. In the beginning, to deal with the challenges of concurrent access<sup>1</sup> and intensive transactions, especially during holidays like Christmas, Amazon invested heavily in computing resources and storing systems. But the computing power of these systems, designed to handle periods of peak demand, went largely unused most of the time.<sup>2</sup> At first, Amazon leased the excess capacity of such resources to third-party users. Its customers were originally individual developers and programmers, later expanding to include both small and middle enterprises. With an increasing number of leasing users, Amazon established an independent subsidiary—AWS, Amazon Web Services, to manage these resources. In 2006, Amazon launched its Cloud Computing Services.

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<sup>1</sup>The number of concurrent users refers to the number of online users interacting with the server simultaneously.

<sup>2</sup>In a 2006 interview, Jeff Bezos, founder and CEO of Amazon, admitted, “Only less than 10 % of our system capacity has been put to use.”

Presently, Amazon provides corporate users with more than 20 types of cloud computing services and offers flexible payment methods. Many technological startups whose business have not yet or matured or who lack sufficient capital stand ready to launch their products and services on the Amazon platform through a pay-for-use model, avoiding the need to purchase the IT infrastructure and operation systems themselves. Now over hundreds of thousands of companies are using such services, including Internet streaming media provider Netflix, photo sharing website Instagram, and even NASA.

According to Businessweek, data from Pacific Crest Securities showed that the revenue of AWS in 2014 hit 5 billion dollars, up 58 % over 3.1 billion dollars in 2013. Pacific Crest Securities estimated that Amazon's cloud computing services would continue to grow healthily, bringing in revenues of 6.7 billion dollars in 2015.

Although Dell, IBM and HP, the top 3 server manufacturers, can achieve sales revenue of 2 billion dollars, 2.2 billion dollars and 2.9 billion dollars respectively every quarter from server hardware sales, more and more customers are inclined to rent a server instead of buying one outright. To this end, Amazon's 1.25 billion dollars "cloud service" business model poses a challenge to the traditional server manufacturers.

Amazon has been successful not only in so-called technology innovation driven business model innovation but also in its cloud services, which had been disregarded as an unrealistic business in the past. So what exactly is cloud computing?<sup>3</sup>

Normally, cloud computing is defined as a business that provide customers public IT services such as computing, storage, application, etc. As early as in 2005, Bill Gates outlined a vision for cloud computing in an internal employee memo: "The next big innovation is waiting for us... The broad and rich infrastructure that Internet owns will trigger a wave of business opportunity of providing real-time application and experiencing service, the service will be able to serve millions or billions customers' needs and will dramatically change the character and price of providing solutions to different kinds of companies." IT analysts, industry experts and business leaders increasingly believe that cloud computing represents the next phase of Internet development and will bring revolutionary innovation to the whole Internet industry.

From 2011 to 2013, cloud computing's shifting position in the Gartner curve of technology maturity proved Gates was correct and illustrated that people were taking a more rational view of cloud computing. Both these points indicate that cloud computing will develop into a period of stable and growing.

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<sup>3</sup>As defined by the National Institute of Standards and Technology (NIST), cloud computing is a model for enabling convenient, on demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction.

## 2.2 What Is New About the Cloud?

The key to cloud computing is the business model. We should not think about cloud computing just as a new technology but also as a new IT service business model. The biggest innovation of cloud computing lies in making computing capability a service and offering it to customers. There are three key ideas here: it is available through the Internet; offers a distributable resource pool; and is requirements based. Cloud computing is a kind of Internet based IT service based on a new supply, usage and delivery model, through which cloud computing surpasses traditional services in terms of cost, cycle of development and implementation, ease of access, scalability of functions, and flexibility.

*Cloud computing demonstrates the value of economies of scale.* Through Cloud computing, all users can share computing, storage and application services at a low cost. This coincides with the equation Samuel Insull, the creator of the electric grid, subscribed to: a greater scale means a high level of energy and lower unit price. As mentioned above, the transition from traditional IT service to cloud computing is similar to that from a single generator to a large power plant. In this way, it follows the idea seen elsewhere on the Internet of “use only when needed”, lowering costs. It also lowers the barrier for individuals or companies to apply other Internet related technologies and offers more functions and services to the entire Internet ecosystem, expanding the breadth and depth of online service.

*Cloud computing means a breakthrough in integrated and high efficiency mass data and information analysis capabilities.* Cloud computing and big data can be compared to Siamese twins. For example, all mobile terminals, partners and users’ personal information need to be collected, stored and processed by the cloud. If we want to analyze big data, we must have an open cloud that holds the data. The capabilities of cloud computing provide not only a technical method of handling an information explosion or flood, but also a method of accelerating future development through big data mining, mobile Internet and the Internet of Things.<sup>4</sup> For example, in the Internet of Things, the exchange of information not only takes place between people, but also between things. This may take the form of massive amounts of data that are transmitted and saved, or (milli)seconds-long computations on this data. This mass of information will require technical support from cloud computing. And in the mobile Internet industry, no matter how fast smartphones develop, small CPUs are necessary to them to remain light and handy. Application programs need an increasing amount of resources, and the use of these programs will rely on the immense storage and computing capability of the cloud.

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<sup>4</sup>The Internet of Things refers to a network in which objects are connected to the Internet according to agree upon protocols and using information sensing technologies (e.g., RFID devices, infrared remote sensors, GPS tools and laser scanners). These technologies help the objects engage in information exchange and communication for the purposes of smart identification, positioning, tracking, monitoring and management in the network. The Internet of Things is in essence a manifestation and an extension of the Internet.

**Table 2.2** “Cloud computing” versus Traditional service model

	Traditional service model	Cloud computing
Cost	Exorbitant expenses from hardware and software purchases, operations and maintenance, and higher IT staff costs	Lower cost due to sharing of a centralized resource pool
Cycle of development and implementation	Longer development cycle makes rapid implementation impossible	Automated and with self-service
Ease of access	Within the company	Anywhere with internet access
Scalability of functions	Long wait for patches and upgrades from software companies	Short cycle; new functions can be made online in real-time, and connected with mobile phones and other devices
Flexibility	Built to meet peak demand; lower resource utilization on average; weaker ability to address unexpected business changes	Pay based on time and traffic requirements; dynamic adjustment; lower scale in case of lower needs
Similar examples	Purchasing electricity generators for self use	Consuming electricity from the power grid

Source Shanghai Institute of Digitalization and Internet Finance

*Cloud computing will increase speed of innovation in all of society.* Having lowered the cost of starting a new venture, it allows startups and innovative companies to focus on their main business, helping them differentiate themselves from and compete with others. In addition, it becomes easier for these companies to expand their business to a global level in a short timeframe. Cloud-based tools for developers have accelerated the growth of technology not only by making it easier for new startups to pursue technology innovation, but also by letting large companies start an innovation project as quickly as a new startup company. Since these projects will not be restricted by initial investment forecasts, the innovative capacity of the whole ecosystem improves.

Higher efficiency, lower cost and more valuable resources are the internal forces driving the booming development of cloud computing, while the low cost of broadband Internet service and high power computer chips are the external ones. Cloud computing is gaining attention globally because of its dynamic resource allocation, customized service to need approach, and unique low-cost mass information processing (Table 2.2).

### 2.3 The DNA of Cloud Service

Now we will examine cloud computing from the cloud service provider’s point of view. As mentioned above, the key innovation of cloud computing is transforming computing capability into a service delivered to customers. There are three kinds of service models or “cloud types” in cloud computing: SaaS (Software as a service),



IaaS (Infrastructure as a service), PaaS (Platform as a service). All Internet based, these three services work through thin<sup>5</sup> to complete processing tasks that would otherwise eat into large amounts of storage and computing resources.

The cloud computing industry has just gotten its start and faces a bright future. IaaS, SaaS, PaaS will enjoy a broad market. There will be a variety of models for cloud services, and IaaS, SaaS, and PaaS will be interconnected. Regardless of the service model, the heart is service. Although technical barriers to cloud service are extremely high, technologies cannot solve all service problems. The cloud service provider should have not only strength in R&D and years of experiences in building and operating the data center, but also a service-oriented mentality. All service offerings and technological innovations should focus not only on the human machine interface and connection, but also on customer need, service delivery, and service experience. The supplier that can build a broader ecosystem and a better customer experience will have the greatest bargaining power. This principle also applies to cloud service providers.

### **Tips SaaS, PaaS and IaaS**

#### **SaaS: Software as a Service**

SaaS is a method of processing software programs that originally were installed locally on the user's machine but are now being relocated to the cloud. SaaS programs are services distributed to millions of users through the Internet using a multitenant framework. Users can order according to their needs, and payment is decided by the level of service and amount of time needed. Users do not need to perform maintenance on the software.

CRM (Customer Relation Management) was the first type of software to realize this type of online application. Salesforce is a company that provides CRM to companies through a wholly cloud computing service—SaaS. Its slogan is “The End of Software”, so it is called the Terminator of Software. In the past, companies are afraid when sales people resigned, because once they did, all their customer information and records would be lost. But once Salesforce moved CRM to the cloud, the sales division could review communication with customers directly and, even while traveling, view all sorts of customer information easily. Customer management executives could check how many phone calls each salesperson made and how many customer interactions there were, then decide whether resource allocation matched up with

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<sup>5</sup>A thin client refers to a computer terminal that doesn't need an application in the client-server network system. Thin clients use some protocols and servers for communications and connect with the LAN. Thin clients transmit the input from devices like the mouse and keyboard to the server, which sends the processing results back to the client. Different clients can log on to the same server simultaneously and work independently. Ordinary clients, on the other hand, try to process local data as much as possible and transmit only necessary data when communicating with the server or other clients.

income structure, and modify resource allocation as needed for greater efficiency. Through this online-based CRM business structure, customers do not need to purchase, install or test the equipment and software. They need only log in and start to use the service, significantly lowering IT expenses.

In the beginning, Salesforce's customers were mainly small companies, but later Sun Trust, Dow Jones, Siemens, Starbucks and Dell, all signed contracts with Salesforce, making it the leader in global CRM solutions. At the end of 2012, Salesforce had 14 % market shares. According to its 2013 Annual Report, Salesforce pulled in 3 billion dollars in revenue, with 5.3 billion dollars in orders and 250 billion data center transactions. The Enterprise Cloud Computing brought in 2.8 billion dollars in revenues. In Q3 2013, Salesforce became the first cloud computing company to generate 1 billion dollars revenue in a single quarter.

Since then, software as a service quickly increased in popularity and reach. New companies were constantly applying this new model in various types of business applications, such as ERP (Enterprise Resource Planning), SCM (Supply Chain Management), and EHR (Enterprise Human Resources). Arguably, almost all traditional business applications can be delivered using a SaaS model. Built upon the resources provided by the infrastructure layer and the environment provided by the platform layer, the collection of these applications on the cloud was delivered to users through the Internet and formed the application layer of cloud computing.

### **PaaS: Platform as a Service**

PaaS can be regarded as an extension of SaaS. This form of cloud computing provides users with a software development, execution, management and monitoring environment, allowing these universal and reusable software resources to be delivered from the providers' servers to users online. This enables users to create their own applications and run them on the providers' infrastructure. To the users, the advantage of this model is that the advanced APIs (Application Programming Interface) of the platforms are easy to use and that development, testing and execution are all based on the same platform. As a result, open resources can be fully utilized to develop customized applications. Moreover, thanks to a powerful and stable basic operation platform and a professional technical support team, PaaS can quicken the development of applications, become more responsive to the development capabilities of users and eventually bring substantial benefit to the users. From this perspective, we can see how the emergence of PaaS lowered the difficulty of developing SaaS and boosted its growth.

Microsoft officially launched the Windows Azure platform on Jan 1 2010. Windows Azure basically provides developers with a platform to facilitate application development. With the Azure service platform, developers can simply connect to services through the Internet, without needing to install

any development tools on their own computers. Based on their existing skills, tools and technologies, developers can use the storage, computing capability and network services from Microsoft global data center and further improve the flexibility and effectiveness of application development. Developers can also choose other development tools or technologies and create applications according to the Internet standards provided by the Azure platform. Microsoft runs and maintains these applications with its own data center. Similarly, IBM has established a cloud computing research center (RC2: Research Computing Cloud) in Zurich and India, Google has its Google AppEngine platform, etc.

Now, enterprises are increasingly paying attention to the new PaaS model.

Mentioned above, Salesforce has moved beyond online CRM service toward the infrastructure platform of a SaaS provider. It set up a software development platform, Force, in addition to an exchange platform, AppExchange. Using its programming language, Apex Code, third-party developers can develop certain add-ons (such as for human resource management and project management) and sell them through AppExchange. Third parties can benefit from this platform, and their participation also helps enrich the alternative application modules and expand the industry ecosystem, enhancing the competitiveness of Salesforce.

### **IaaS: Infrastructure as a Service**

IaaS lets users obtain services, including virtualized computing, storage and network resources, from a robust remote infrastructure, and directly set up a platform and applications on top of the infrastructure layer. IaaS is the foundation of cloud services. Compared with PaaS and SaaS, IaaS means capital investment in large amounts and the construction of service platform at scale. Those companies that are strong in the traditional IT realm struggled while transforming to IaaS service, because unlike Internet companies, they didn't have the usage scenarios of large-scale computing and a large client base. This means that IaaS participants are those enterprises that have abundant funding or the corresponding resources, such as telecom and ecommerce companies. It is possible even for server manufacturers to enter this sector.

A typical example is the previously mentioned Amazon. According to data from Netcraft, as of May 2013, Amazon had 158,000 networked computers that provide hosting services for 11.6 million websites. EC2 charges only 15 cents per gigabyte of storage and the server rental costs 10 cents per hour. This has been launched in all 9 regions where AWS has business. Nasdaq and The New York Times are clients of Amazon's S3 service. Nasdaq stores its historical stock exchange records on Amazon's cloud computing platform. *The New York Times* stores 4 TB of news reports on Amazon's cloud computing platforms and used its cloud computing capabilities to process 11 million articles in less than 24 h at a cost of 240 dollars. This required far less time and money than if they had used their own servers.

## 2.4 The Cloud in Business

In your work, do you often encounter situations like the below?

Account manager Mr. Yang was on a business trip to another city when he received a phone call from the CEO in the departure lounge. Yang was told he needed to finish analyzing the financial report from the last quarter in two days. He became anxious upon hanging up the phone. He had not installed ERP software on his laptop; if he called his colleagues, it would still be impossible for them to get the complicated financial reports together in such a short while. If only the ERP system could push the financial data to his mobile phone in real time...

As the CIO of the company, Mr. Zhang was sitting in his office with a worried look on his face. The company's business was growing fast, and business processes were always being reorganized. Consequently, the ERP system needed to quickly respond and adapt to such changes. In the beginning of the year, the IT department developed a new business process, which had been in place for only three months. Now it needed further adjustment so it could be on boarded in one month. The company's IT hardware and personnel both faced bottlenecks. The scarcity of resources made it a challenge to keep up with the rapid development of the business and the variable demand. Given the limited annual IT budget, should they look for new solutions, or spend the time and money for hardware upgrading and redeployment?

Due to the friction between the company's various business needs and its huge information system, every day the company's IT engineers grappled with legacy problems from the redeployment. What countermeasures are there to these problems? The answer is cloud computing.

In recent years, enterprises have shown growing interest in cloud computing applications, particularly for cloud-based ERP. IDC forecasted that in 2014, the market size of cloud computing software would shoot up to 40.5 billion dollars, translating into an annual growth rate of 25.5 %.

### 2.4.1 Kingdee Helps Companies Look to the Clouds

With the rise of mobile Internet and more post-80s and post-90s people entering the society, both consumer demand and enterprise internal management are faced with new challenges. How should the relationship with consumers be rebuilt using new technologies? How should businesses respond to rapidly changing market demand? How can they improve internal operation efficiency and achieve transformation in the Internet age? The decision to disrupt traditional ERP with cloud computing, mobile Internet, and social technology as the foundation, and to adopt the "cloud + end" model in innovative ERP cloud services will become inevitable for enterprises pursuing transformation. And it appears Kingdee's K3Cloud emerged at just the right moment.

By leasing Kingdee's K3Cloud, enterprise clients no longer need to invest heavily in lots of servers. The ERP system deployed through the Internet is put to use once activated. Regardless of where they work, business and financial staff can access K3Cloud to manage the operations, including sales, purchase, inventory, outsourcing, and management of financial accounting and statements. Whenever enterprises run into any problem during use, Kingdee responds instantly, without the enterprise needing to arrange for IT personnel to maintain and update the system. To enterprises, the new cloud model is like a serviced apartment that people can move into conveniently and quickly. This greatly reduces enterprises' IT cost along with the headaches that arise from system installation, maintenance, server relocation, and damage. Staff can focus on their own work as part of the asset-light strategy. This is particularly valuable to those companies whose business and structure always change, helping them avoid the need to relocate computers and data centers when their offices move.

And once in place, K3Cloud is compatible with various types of equipment and devices. This easily satisfies enterprises' mobile demands, making ERP accessible anytime. Account managers no longer need to worry that they won't be able to address an urgent problem during a work trip, because they can deal with business easily and conveniently from their mobile phones.

### ***2.4.2 Yonyou Seizes a Cloud Opportunity for Transition***

Traditional software providers are now transforming into Internet platform providers by following the cloud trend. Yonyou group is a pioneer among them and has invested heavily in cloud computing. The company's key work is the planning and development of a cloud platform and driving a business transformation in line with its platform strategy. The core of this strategy is synthesizing Yonyou's resources (clients, applications and services) based on the new cloud computing and mobile Internet model. In the meantime, the company has fully integrated third-party resources to achieve high customer value, as well as Asia's largest and a world-leading enterprise cloud computing platform—Yonyou cloud platform.

Yonyou's cloud platform will achieve data consolidation and integration. Yonyou's platform strategy indicates that the company's existing operational model will experience a big change. All corporate clients' data will be integrated into a unified data platform, and all application systems and service will be embedded in the unified platform's service. Marketing/sales services for customers will be based on Yonyou's cloud platform.

An enterprise app store will be the core of Yonyou's cloud service platform. As an operation service platform that directly faces the end user, Yonyou's collaboration in the value chain is mainly seen in two areas: the construction of platform and operational capability. Centered on the app store, Yonyou's cloud service platform will follow the principles of partnership and mutual benefit between

platform operator and independent service developers, and will boost cloud-based application and product services, strive to develop the app store into a meaningful, profitable and reputable service brand, and achieve sound development in the platform.

### ***2.4.3 AliCloud Propels Yu'E Bao Behind the Scenes***

What is the driving force behind Yu'E Bao? The answer is AliCloud. On June 13th 2013, Alipay secretly launched its online deposit-service-like offering—Yu'E Bao. This service combines the functionality of Alipay with the sales of the Tianhong Zenglibao money fund. Its core is the sales of money funds. Though seemingly ordinary, Yu'E Bao has impressed both the business and financial world. According to the quarterly report of Tianhong Fund, as of November 14 2013, Yu'E Bao had 29 million users and had raised more than 100 billion yuan, a first hundred-billion fund in China. By March of 2014, it had raised more than 500 billion yuan in total and had become the fourth biggest money fund in the world.

Yu'E Bao, which holds more than 500 billion yuan, offers money management services to tens of millions of online customers, handles 11,000 real time transaction requests per second, settles 300 million digital transactions every 140 min and squares accounts in just 30 min, rather than 8 h for a traditional bank. How is Tianhong Fund able to handle such an astronomical number of transactions? The answer is AliCloud. Just by getting access to the cloud, Tianhong Fund is able to deal with millions of transactions every day and hundreds of millions of transactions during Singles' Day (November 11) in China. On that day, Yu'E Bao redeemed 6.1 billion yuan and paid for 16.8 million transactions yet did not suffer any serious technical problems. Yu'E Bao also developed a second direct fund selling system, and had collected, applied and mined a vast amount of data resources. This would have been difficult to imagine and impossible to realize for the traditional model.

## **2.5 The Cloud in Our Lives**

In the book *It Is Not Important Any More*, Mr. Nikolas Carl said: "Once the 'Cloud Computing' service becomes mature, the concept of giving up personal computer will become more attractive. At that time, every one of us can use the abundant software service and can use unlimited online storage. We also can use the Internet from different devices (for example, mobile phone, television and etc.), and share our data and application. It is unnecessary to lock our files and programs into the hardware of personal computer." Today it looks like Carl's forecast is coming true.

With the rapid development of cloud computing, cloud services are getting closer. Cloud applications are diversifying and today include the education cloud, sound cloud, government affairs cloud, cloud storage, cloud safety, and cloud social contacts.

The Cloud is all around us, transforming how we live and work.

### ***2.5.1 Remote Collaboration: Cloud Office***

With the continuous development of cloud office,<sup>6</sup> today's cloud office applications are not only compatible with traditional office documents, but are also capable of editing and storing files professionally through an Internet browser client. In addition, more than one person can edit or modify one document at the same time, and share it at any time and at any place with mobile Internet. This lightens staff's working loads.

Rolled out by Apple in 2013, iWork for iCloud supports all kinds of operating systems (iOS, Mac OS, and Windows) and many web-browsers (Chrome, Safari and Internet Explorer). At the same time, iWork for iCloud can merge with a Word document seamlessly. For example, one can drag a Word document on the computer directly into 'Pages for iCloud', and then edit it after loading.

With iWork for iCloud, one can log into a web-browser on a laptop, whether Mac or PC, and store and edit documents in iCloud via the Internet client. iCloud will automatically sync any document across all connected iOS devices (iPhone or iPad) and the iWork application of the Mac desktop computer. Of course, the newly created or edited document will also be uploaded to iCloud. Thus, you can visit and edit documents in many ways.

Imagine such a scene: Before going on a trip, you only need to upload the documents to iCloud, and then it does not matter where you go: As long as you have access to the Internet, you can use your iPhone, PC, iPad or other device to search, read and edit documents that you had stored in the Cloud. The changes are then uploaded or synchronize directly to iCloud. For a company, this convenience enables staff to modify, edit and even annotate documents in the cloud.

### ***2.5.2 New Experience: Sound Cloud***

Under the traditional communication-computing model, sound is handled by a single communication device, for example, a mobile phone. With the support of cloud computing, you can convert file types, use voice recognition, and take

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<sup>6</sup>In a broad sense, a cloud office describes a government or company office based entirely in the cloud; in a narrow sense, it can refer to providing the organs and companies with office-document-centric, cloud-based SaaS services, such as for document editing and storage, collaboration, communication, mobile office, and workflow.



advantage of other tools all through the cloud. The sound cloud supports continuous online sound recognition with fast speed and high accuracy. For example, when we ask Siri a question on the iPhone, the intelligent system behind it is the sound cloud platform. So it can be said that mobile devices and sound cloud function will not only make our lives more convenient but also bring a better customer experience.

The domestic finance company Pacific Insurance released its CPIC Voice system using the sound cloud platform. It is a kind of intelligent insurance follow-up system that allows agents of Pacific Insurance to manage its follow-up service without going to the home of the customer. It works by planting the standardized voice into the system and loading with the up-to-date sound recognition technology, and the voice or sound cloud allows recognition of the person's voice. This has not only improved the customer experience but also reduced costs from phone operations.

In situations where a person's eyes and hands are both occupied, the sound or voice cloud receives high demand. For example, a sound cloud system is used when it is impossible to use multipoint touch and control, as when driving a car. There is a kind of sound cloud driving system called iVoka, which after you install it in your car, recognizes your spoken requests and responds with accurate feedback. The system is hands free, helping ensure safety while you drive and use iVoka to play songs, find out the weather, get stock updates, hear flight information, etc. iVoka also has strong pathfinding functionality, searching for and suggesting the best route to your destination, as well as restaurants, entertainment options and scenic locations according to your tastes. For example, if you want to find a range of places to have fun in a city on the spur of the moment, you say your current location to the sound cloud service, and it will then find a destination from thousands of interesting places through the cloud server, plan the fastest and most direct route, and start guiding you to the selected venue.

In short, you only need to use your voice while relying on the sound platform through a mobile device, and then the rest will be taken care of without any extra effort. Thanks to this system, our lives will become more efficient and colorful.

### ***2.5.3 Massive Space: Cloud Storage***

One big innovation brought by cloud service is the shifting emphasis from equipment to information. Equipment, including computer programs, is just a short-term visitor, and the era of expensive hardware devices will have soon passed! Most valuable are the information stored in the devices and where it should be stored for a long-term. Thus cloud storage came into being.

To put it simply, cloud storage is a kind of solution for putting storage resources into the cloud for information upload and download. The user can store and get information conveniently at any time and any place by connecting to the cloud through the Internet. The key is actually to realizing the switch from storage



equipment to storage service by software application. When using cloud storage, the user has not only the necessary equipment available but also the data retrieval service offered by the whole cloud storage system.

Baidu took the lead in jumpstarting the “T era” in personal cloud services by providing 2 terabytes of free storage. Baidu’s is a kind of personal cloud service catering to users’ storage, synchronization and sharing needs. You can store hundreds of thousands of pictures and songs, and hundreds of hours of video. Unless you have a strong inclination toward storing HD film, you will likely never use up the 2 terabytes of storage.

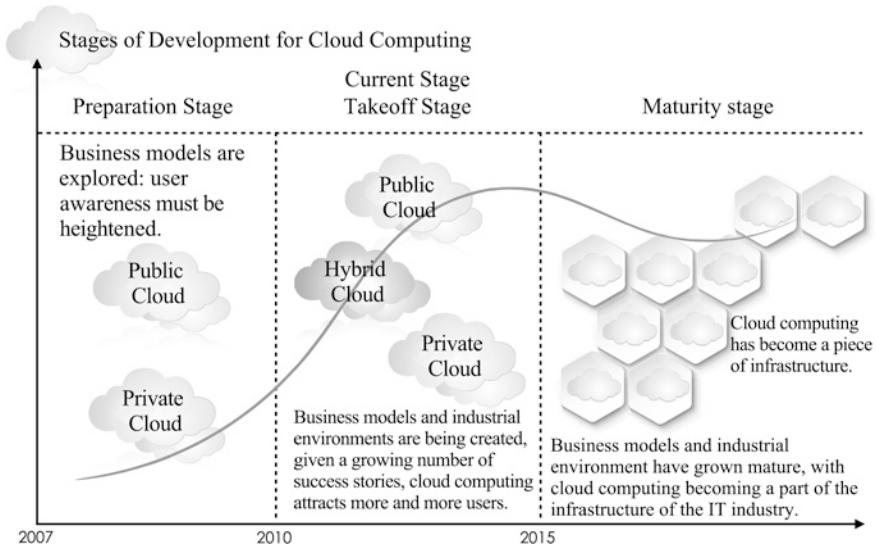
## 2.6 The Future of the Cloud

The suppliers of cloud services not only offer all of the necessary Internet infrastructure, software, and hardware platforms, but also are responsible of a series of services including the initial system setup and ongoing maintenance to the increase practical value for customers. Customers in turn gradually hope to switch each kind of application program and infrastructure service to the cloud platform. Therefore, the previous question of whether to build a cloud platform has become a question of when and how to build it. For example, many enterprises start building their cloud capability by outsourcing it, switching the strategic emphasis from technology development to the power to manage business processes and key data. In this way cloud computing has become highly regarded by industry, and a series of platforms and services based on cloud computing have started to appear.

According to the *White Paper of Cloud Computing* (2014) issued by the Research Institute of the Telecommunications Ministry, presently, public cloud computing services in China remain in their infancy. In 2013, the national market scale of public cloud computing service was about 4.76 billion yuan, an increase of 36 % year-on-year, far higher than the global average. Although China’s cloud computing services make up only 3 % of the global total (the US’ global market share is 60 %), surging market demand in China will give a huge boost to the industry. By the end of 2015, it is projected that the size of China’s cloud computing market will reach 13.669 billion dollars.

IDC forecasted in the newest report that the global expenditures in cloud computing in the next five years will grow six times faster than the traditional IT industry and triple in size. As of 2014, the global market size of cloud computing was 42 billion dollars, accounting for 25 % of the total increase in IT expenses. From the end of 2009 to the end of 2014, cloud computing brought China a net income of more than 1.1 trillion yuan.

The national trillion-yuan-size cloud computing market is on the horizon, with the industry on course to usher in a golden age. At the same time, cloud computing will become a new engine of economic development in China. Over the past ten years, the progress of IT technology has pushed the Chinese economy forward.



**Fig. 2.1** Cloud computing at the takeoff stage (with more clouds to come) *Source* Gartner, Ping An Securities Research Institute

Cloud computing will contribute to companies' IT applications, industrial upgrading, economic restructuring, and business incubation.

Nevertheless, there are some doubts about cloud computing, particularly about its safety. Is it truly safe for companies to engage a data escrow agent via the cloud without building their own data center or implementing private data storage? Another concern involves the uncertainty of long-term IT costs compared with instant reduction in short-term costs. In an ITValue survey of CIOs, 19 % of the respondents said they were already using or deploying cloud computing, 28 % were considering implementation within the short term, whereas 53 % had no timetable at all. Most of the corporate concerns focus on safety and privacy (Fig. 2.1).

### **Tips Safety and Privacy in Cloud Computing**

Concerns about cloud computing include:

- **Information Safety**

Some data include confidential information or business secrets, the loss of which will greatly affect the prospects of a company.

- **Data Privacy**

How to prohibit the unauthorized use of data stored in the cloud.

- **Integration with the existing IT system**

Is it possible to ensure the continuity of pivotal working processes during the integration between cloud service and the existing IT system?

- **Implementation**

Cost, feasibility and cycle of transition from the existing system to cloud service.

- **Maturity of technology**

No universal technical standards, interface standards in particular were designed out for cloud computing. This has presented great challenges to connecting among different services in the future.

For companies using the Public Cloud,<sup>7</sup> the biggest concerns are safety and privacy. Safety refers primarily to the loss of data in rare circumstances. It might sound hard to believe for some companies, but it really happens: on February 15, 2009, the EC2 service of AWS (Amazon Web Services) suffered a large-scale suspension during which the data of some clients was permanently eliminated (caused by a software deployment that mistakenly terminated some user instances). For clients in need of a safe and reliable platform, such a breakdown and loss of data, though rare, can be fatal. In addition, if a company stores its data solely on the cloud without any backup, the data remains at high risk.

While safety problems are more related to technology, privacy issues involve multiple areas. In 2011 alone, there were two large-scale leaks of private information. In March, a large leakage happened at Gmail, when 150,000 users found their emails and dialogues deleted; some even found their account reset. In April, Sony's PlayStation network and Qriocity were both hacked and stay offline for a week, during which information from 77 million user accounts was stolen. In fact, as long as data are shared from an intranet to the Internet, there is no way to physically isolate the information and guarantee that it can't be leaked. Major privacy issues for the cloud include:

- User data being accessed illegally or without authorization.
- The acquisition of private data by the government or other powerful institutions from the Cloud Service Provider for the purpose of regulating, manipulating and controlling information.
- The collection of data by the Cloud Service Provider for its own commercial interests.

The ongoing rise of the Private Cloud<sup>8</sup> and Hybrid Cloud<sup>9</sup> provides a better solution for possible safety and privacy issues in cloud services. Theoretically, the Private Cloud, unlike the Public Cloud, is not influenced

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<sup>7</sup>Public Cloud (through the Internet) refers to a massive cloud system leased or sold to the public.

<sup>8</sup>Private Cloud (through an intranet) refers to a cloud system independently owned or leased by companies.

<sup>9</sup>Hybrid Cloud refers to a combination of the public and private cloud to deliver the IT service.

by bandwidth, safety or law. On a practical level, however, companies are facing unresolved cost and technological problems, and are especially concerned that the Private Cloud, which involves huge expenses and complex deployment issues, will one day be replaced by other innovations.

As a result, a combination of both public and private clouds, known as the Hybrid Cloud, has received great attention. With Hybrid Cloud services, companies often outsource less important data to the Public Cloud, while at the same time establishing their own Private Cloud for important data. In *Tech Trends 2012: Elevate IT for Digital Business* authored by Deloitte CEO White and CTO Briggs, it is stated that companies should regard the Hybrid Cloud as the long-term trend, instead of worrying over the concept of private and public clouds.

Information asymmetry between cloud service providers and corporate customers is another cause of concern about cloud services. As mentioned in the previous section, corporate users are embracing cloud computing, which for them is simply a black box. And users have little ability, both in terms of resources and professional knowledge, to access the details concerning the cloud service. On the other hand, due to commercial confidentiality and safety concerns, cloud service providers are unwilling to share a lot of key information concerning their cloud offerings, leaving the service uncontrollable to users. Consequently, although a cloud service provider can offer better solutions for data safety and backup, corporations tend to discount such benefits since hosting on the cloud poses possible threat to their key data and services. Additionally, worries about the integrity of cloud service providers, legal issues and regulations for cloud operations, as well as about hidden risks and loopholes resulting from the technology, add to potential users' fears about information security.

## 2.7 Conclusion

Cloud computing is evolving at a geometric rate, and still requires perfection and optimization as an innovation. Applications based on cloud services will not destroy the current market overnight, nor can cloud service capabilities be established in a day. A shift from technology to operations will be required, and it is possible that there will be a long period during which individuals and companies need to conduct business on the platforms of both traditional and cloud services. Nevertheless, one thing is certain: the future belongs to the cloud.

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