The Trend of Cloud Computing in China

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Abstract—**With the rapid development of internet, cloud computing rapidly becomes the next round of growth wave in IT industry. In this paper, we introduce some recent trends in the cloud computing in China. We analyze the policy, the related companies, the advantages of this sector, the services and also some technological problems existed in this area.**

Index Terms—**cloud computing, trends, IaaS, service**

I. WHAT IS CLOUD COMPUTING

Cloud computing is a super internet based computing model in which tens of thousands of computers and servers are connected into a computer cloud. Therefore, the users can get access to the data centers through their computers, laptops, cell phones, etc. Cloud computing allows you to experience more than 10 trillion times per second computing capacity; the computers in the clouds will significantly change the current computer model. Cloud computing comes into focus only when you think about what IT always needs: a way to increase capacity or add capabilities on the fly without investing in new infrastructure, training new personnel, or licensing new software. Cloud computing encompasses any subscription-based or pay-per-use service that, in real time over the Internet, extends IT's existing capabilities. A cloud service has three distinct characteristics that differentiate it from traditional hosting. It is sold on demand, typically by the minute or the hour; it is elastic - a user can have as much or as little of a service as they want at any given time; and the service is fully managed by the provider (the consumer needs nothing but a personal computer and Internet access). See [1][2][3][8] for more. Significant innovations in virtualization and distributed computing, as well as improved access to high-speed Internet and a weak economy, have accelerated interest in cloud computing.

II. WORLD TRENDS OF COULD COMPUTING

Cloud computing is becoming the new trend of world's IT industry in the background of world economic recovery. The global IT industry will enter a renewed growth phase: Gartner's report shows that the global IT spending in 2009 decreased by 5.2%, but the global IT spending in 2010 is expected to grow by 3.3%. China's IT industry will be supported by strong demand from downstream industries and rapid growth of outsourcing and rapid

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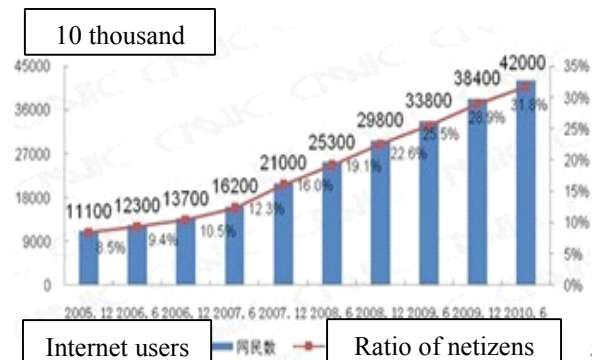
growth of internet users. (see fig 1).

Fig 1

Cloud computing makes breakthrough with the rapid growth of things internet. It tops Gartner's list of 10 strategic technologies in 2010 and will become the mainstream technology in the coming two to five years. Things internet breaks the boundaries of interpersonal communication and has been recognized as the general direction of the industrial development. Among the three key technologies in the field of things internet, sensor networks and data transmission is limited by many factors and there is still a long way to go for the two to become mature. But the emergence of cloud computing greatly improved the information processing capabilities and completely changed the computing and storage approach as well. With its efficient and on-demand computing power, computing revolution has become the first breakthrough in the key areas of things internet. Compared with the traditional communication methods, things internet has added information collection function, e.g. sensor network, and mass information processing function. Cloud computing with its massive and cheap computing power is the next big thing for things internet. (see the cloud structure in fig 2) . See [4][5][11][12] for more.

In the public computing area, cloud computing has been widely used in applications such as Google Mail and Facebook services, in enterprise computing, small and medium size enterprises will turn to public clouds due to its low cost and flexibility. In the private clouds, large enterprises one hand want to use the cloud to improve their own efficiency and flexibility in operation, and on the other hand, provide the excess internal data center computing and storage capacity available to other companies. As the first break through area in things internet, cloud computing has become an international recognized core technology and development and the related IT spending is expected to increase by a

compound rate of 27.3% in the next three years, more than five times of the growth rate of IT spending in the areas other than cloud spending.

III .SOME TRENDS IN CLOUD COMPUTING IN CHINA

First, the national policy is promising for cloud computing in the new period of development. China's current strategic and emerging industries include energy saving, new generation of information technology, biotechnology, high-end equipment manufacturing, new energy, new materials and new energy vehicles. Among the seven sectors, the new generation of information technology is put at a top position. New generation of information technology involves 3G, geospatial Information Industry (3S), things internet, information security and cloud computing. These major areas will be a hundreds of billions of RMB future market. Strategic information industry through digital, information, intelligence will accelerate the process of other strategic growth of new industries. So cloud computing company is worth close attention by investors.

Cloud computing industry is considered to be the fourth IT revolution following the large computer, personal computers and Internet. Cloud computing is so significant for communication and information technology that no countries are reluctant to miss this opportunity. International Data Corporation (IDG) predicted that by 2012, the global "cloud computing" services market will reach 420 billion U.S. dollars.

The Chinese Government attaches great importance to the opportunities offered by cloud computing. Beijing, Shanghai, Wuxi and some other cities put forward cloud development plan. Shanghai issued 3.1 billion 3-year plan to promote 13 projects; Beijing clouds program already started, and strived to world-class cloud computing base.

Second, the cloud computing industrial chain is taking shape.

A: the ability to build a significant infrastructure improved, the software industry overall strength steadily increased. As China has made great progress in servers, storage, network equipment, chips, etc. in recent years, the cloud computing capacity building has been significantly improved.

B: China's basic software sector, application software sector, technical product strength has been increased and widely applied in the field of national economic and social information.

C: The Internet business expanded rapidly, particularly Internet-based business model innovation. At the same time, as Baidu, Alibaba, Tencent and other enterprises have already accumulated very rich technical reserves in the enterprise content services, so the Chinese enterprise has also been continuously enriched in the cloud content, all this combined together initiated China's industrial chain in the cloud computing.

D: The industrial chain gradually takes form, and each part of the chain has its own representative group, and the over layout of industrial chain is expected to bring benefit to all related sides. Cloud computing can be achieved depends on the implementation of virtualization, automatic load balancing, on-demand software and hardware platform. The main provider in this area is the traditional leader in software and hardware manufacturers and leading companies including IBM, Cisco and so on. The domestic companies include Inspur, Huasheng, ZTE, and Lenovo, etc. In order to help users build a cloud computing software and hardware platform, system integrators are also required. In this area, we have Amazon, Google from abroad. The home companies include Inspur, Neusoft Group etc. In addition, the cloud computing industry chain also includes service providers which provide business and personal computing and storage resources to users. The vast majority of computing and the future application development will commence in these services. We have already domestic service providers such as Pengboshi and SUJING Tech etc. See [9][10] and fig 2 for more.
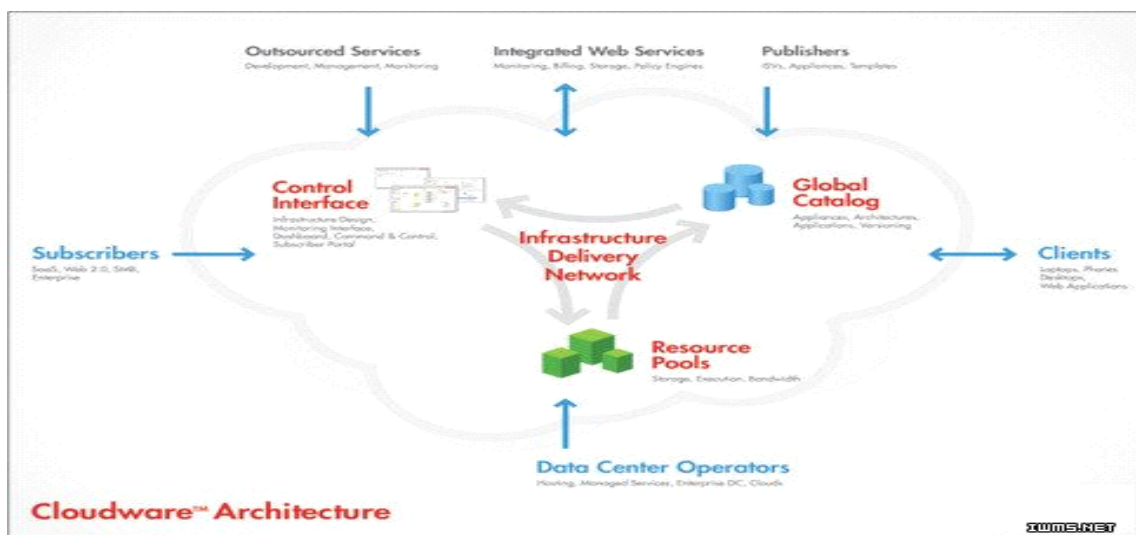

Fig 2

IV. KEY COMPANYS IN CLOUD COMPUTING

Cloud computing will become the next growth cycle for IT industry. There is still big room for cloud computing to grow in China, if we look at the traditional IT infrastructure transformation, restructuring of explosive demand for mobile Internet, the traditional industries upgrade of information technology and continuing popularity of incremental demand. Many local system integrators and platform providers face a golden development period. There is advantage for system integrators mainly because the essence of the process of China's integration of the two is the integration process of different hardware, software applications, and system integration. We are optimistic about China's information industry development which from the point to the surface and even further to the full range of development. We believe that local cloud platform providers (servers, storage and infrastructure software, application software) has the advantage, mainly because cloud computing has weakened the significance of the difference between hardware and software platform. The focus will be on business applications. This narrows the gap between local manufacturers and multinational corporations.

Some local companies:

Shanghai's *Shengda*: Shengda focused previously on game production and now e-books. Now Shengda put forward these products through the cloud computing model and successfully turned itself into a provider of comprehensive Internet entertainment. Some companies like UF, Wei Kingdee has its own library network. Some companies like YouSang hopes to expand to family services clouds through the strategic framework for innovative business models.

Teamsun: a well-deserved leading cloud computing company. As one of the largest IT service providers in China, Teamsun accelerated its business transformation and the layout of the forward-looking business strategies of cloud computing. Teamsun is becoming the first provider with "cloud computing" concept of IT services.

Inspur:

Inspur focus on industry applications cloud. On August 19, Inspur officially launched "the sea of clouds In-Cloud" strategy Beijing. It will focus on developing high-end servers, mass storage and other hardware products and cloud computing center operating system, and focus on China's "Industry cloud" applications. Inspur has positioned its self very well and has its own clear definition of industry clouds. With its own products, systems, self-development of large servers, mass storage and cloud operating system, the leading international manufacturers has already take the advantage of the second establishment of "one center, three dimensional" cloud product and technology R & D system, ranging from hardware platforms, resources, platforms and data platforms. See [6][7] for more.

V. SEVERAL IMPORTANT TECHNICAL ISSUES

Cloud computing software and services industry should be the top priority. In the clouds, not only software and hardware which build the computing environments are involved but also involve cloud-based services provided by the environment. Just as it is impossible to discuss the use of computer without hardware, it is impossible to discuss cloud computing without clouds hardware which is the most basic parts. If no servers, storage devices, network hardware support, whatever cloud computing, or any other type of computing can not achieved. But cloud computing hardware can also be used for everyday computing and grid computing environment. In other words, the hardware is only formed the basis of the cloud, though essential, but difficult to reflect the unique nature of the cloud. It is cloud computing software that reflects the uniqueness of cloud computing. With virtualization, distributed memory, parallel processing and data management infrastructure software, cloud computing resources can be able to achieve its convergence, rapid flexibility, and controllable and other features. With a variety of service software, cloud computing can be able to provide users a wide variety of services online.

Although the service is based on the cloud hardware and software, cloud computing gets attention and support mainly because of cloud services. For the users, it is difficult to know the true sense of the existence of cloud hardware and software. Users can only directly experience and enjoy cloud services. So the prospects for the future development of cloud computing depends on the expansion and enrichment of the content of cloud services.
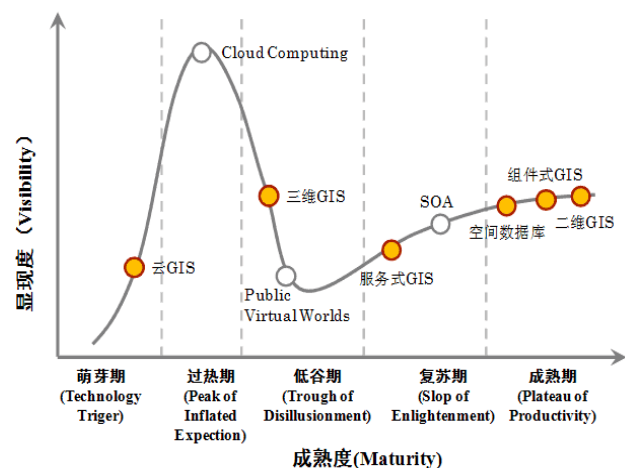

Fig 3

V. CLOUD COMPUTING INDUSTRY CHAIN

In the recent years, the industrial chain surrounding the concept of cloud computing is taking shape. Both the up stream and the down stream already have their own representatives which are usually international leaders.

Hardware and software platform providers: Cloud computing can be achieved depends on the implementation of virtualization, automatic load balancing, on-demand software and hardware platform, in this area we have the main provider of the leading hardware and software manufacturers such as EMC as well as IBM, Cisco. Main features of their product are both flexible and stable clustering solution and standardized, low-cost hardware. As to the domestic companies we have Teamsun, Huawei, ZTE, Lenovo and Founder Tech.

System integrators which are intended to help users set up cloud computing software and hardware platforms, particularly in business private clouds include IBM, HP and Amazon, Google, AT & T and so on. These brands generally have a strong R & D capability and adequate technical team, as well as flexible products. Domestic companies include Teamsun, Inspur, Neusoft Group, Digital China and so on.

Service Providers: This section covers the IaaS companies that provide computing and storage resources to business and individual users such as Amazon and Rackspace which provides new data center services. Part of this is one of the core areas of cloud computing, the vast majority of computing and the future application development will commence in these services. Domestic service providers include China NetCenter, Ultrapower and so on.

Application developers: the SaaS application service providers include traditional software providers such as Microsoft's live services, Internet giant Google's gmail, map, and the emerging online Salesforce and other CRM solutions. Major domestic business software providers such as UF, Kingdee, and other companies belong to this category.

Key areas in cloud computing industry can be summarized to four aspects:

First, research and innovation needs to be strengthened and applied to increase the role of cloud computing, the security of cloud computing to support the development and breakthrough in cloud computing industry.

Second, the range, level and quality of services of cloud computing should be further increased.

Third, priority areas should be selected to carry out the demonstration of pilot project. China now has chosen five provinces and cities for standardizing the cloud computing services...

Problems regarding cloud computing,

First, there are still compatibility, security and many other problems regarding cloud computing. Currently, cloud computing platform can not achieve the ideal performance level. At the same time these problems bring some business opportunities. Cloud features make the

virtualization and cloud computing with centralized data and other low-carbon IT, Green IT to become a reality. In addition, cloud computing advocates information is services, that BPaaS, SaaS, PaaS, and IaaS. The cloud computing model shares some similarity in performance with the power supply, which is integral, relatively stable, high compatibility. Variable costs in order to make business model will change to "lease" and "immediate-use" business model and corporate performance will have a cloud of data dependency, reliability, security, data centers will face challenges. But the current cloud does not have the above performance. Technological bottlenecks still existed for the expansion.

Secondly, the cost of cloud is variable and the cloud platform's load is unpredictable that makes price change too quickly.

Thirdly, the operating language between different platforms is different. That means once a user gets used to a platform, then it will stuck with this platform. The reason is that, at present, each of the different platforms are limited by cloud platform and transferability. Finally, Issues of data security, responsibilities, and legal rights are also a concern. To address these problems, relevant laws and regulations are needed to be formulated. See fig 3 and fig 4 for more.
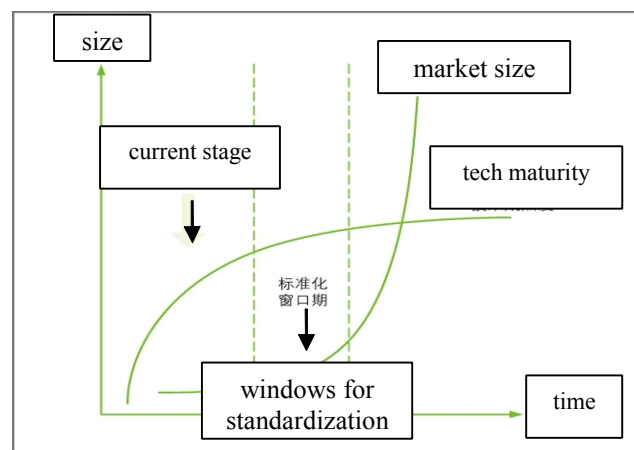

Fig 4

VI. CONCLUSION

Like the rest of the world, the cloud computing in china is developing very vast. The related technology, services and application is thriving. However, there are still some problems in service and application area. With the joint effort made by the government and enterprises, cloud computing will have a brilliant future in China.

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