

## **Who holds the most cloud computing patents now? A preliminary analysis**

Prior to becoming an IBMer, I was very fortunate to work at a company called **Transpacific IP** (a well-known intellectual property acquisition, management and consulting firm headquartered in Asia). This unique experience gave me first-hand knowledge of how patents can serve as a vital strategic value to a corporation. Up until now, I've noticed there has been little discussion regarding cloud-computing patents in our *Thoughts on Cloud* blog. Thus, I believe it would be interesting to shed some light on who are the primary "cloud computing" patent holders now.

But before we delve into the topic, what is a "patent" exactly?

According to the USPTO (United States Patent and Trade Office):

*"A patent is a property right granted by the Government of the United States of America to an inventor "to exclude others from making, using, offering for sale, or selling the invention throughout the United States or importing the invention into the United States" for a limited time in exchange for public disclosure of the invention when the patent is granted."*

Please pay attention to the verb "**exclude**". In essence, unless the patent owner is willing to license the rights, the patent owner is the only entity that can use the invention for commercial usage.

Please also note that **a granted US patent is only valid in the US**. In order to exercise the rights of the patent in other countries, the invention must go through the patent application process of that particular country. Consequently, for any strategically important patent, there will always be a patent family, where the same patent has been granted by multiple countries.

As competition rapidly intensifies in the cloud computing market, IT companies are racing to increase their cloud computing patent portfolio. Sooner or later, like the raging smartphone patent war we have seen between Apple, Samsung, HTC and so forth, a similar war will be waged in the cloud computing industry.

Please understand with no professional patent analysis tool on hand and limited free time, I needed to narrow down my search scope and concentrate on patents that included the phrase "cloud computing" in either the patent title, abstract or claims (claims define the scope of the patent protection). Although this only covers part of the overall cloud computing patents that have been issued (some may not have the phrase "cloud computing" in it), it provides a glimpse as to who are the major players now.

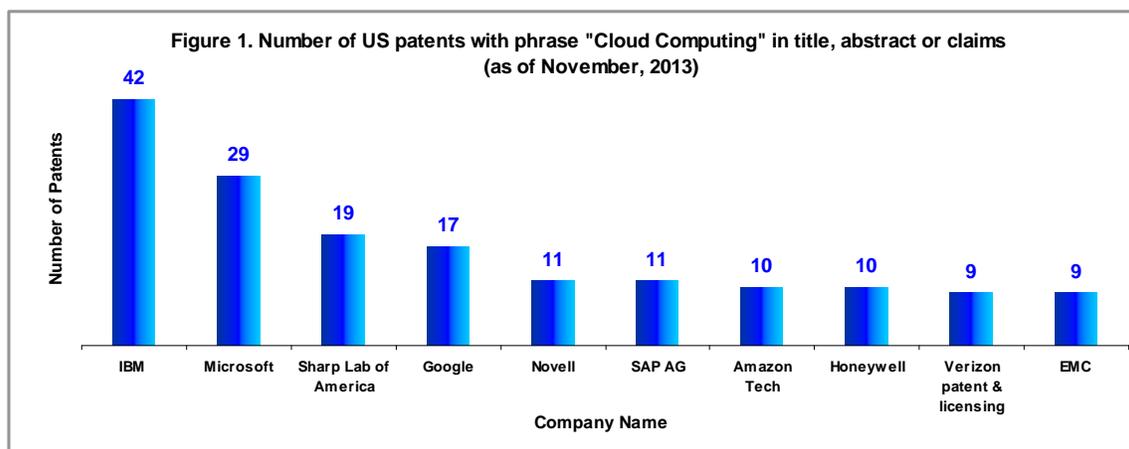
The results of my analysis are presented in the following graphs and tables. Figure 1 shows the number of issued US patents. The reason behind the special attention on US patents is because they are considered more valuable than those granted by other

countries. This is because many of the patent infringement cases are filed in the US. Meanwhile, Figure 2 portrays the number of patent families. The family consists of patents based on the same invention filed in different countries. Noteworthy, the family may not necessarily include a US patent. The purpose of this figure is to depict the cloud computing application trend.

Separately, Tables 1 and 2 respectively show the Top 6 and Top 10 IPC (International Patent Classification) codes that were assigned to the patent families and US patents. As defined by WIPO (World Intellectual Property Organization), “*The International Patent Classification (IPC), established by the Strasbourg Agreement 1971, provides for a hierarchical system of language independent symbols for the classification of patents and utility models according to the different areas of technology to which they pertain.*”

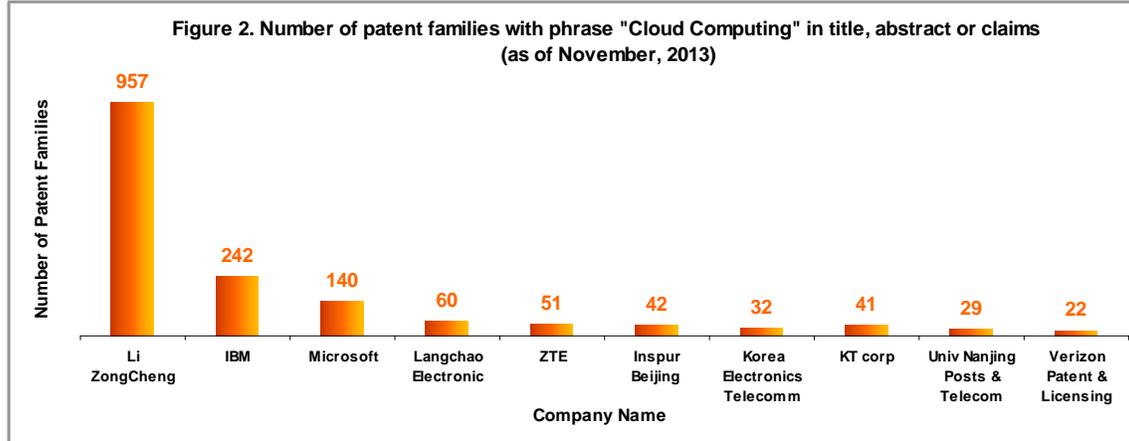
The IPC code for Table 1 ends at the 3<sup>rd</sup> hierarchal level, while Table 2 ends at the 5<sup>th</sup> (the technology classification for the latter is more detailed than the former). The reason for stopping at the 3<sup>rd</sup> level for Table 1 is because the IPC code type increases sharply when at the 4<sup>th</sup> or 5<sup>th</sup> level. Thus, a significant amount of time would be needed to compile the statistics. Essentially, based on the Top 10 IPC codes, we can infer which codes are primarily used for cloud computing.

For everyone’s easy reference, I have summarized my findings in bullet points. The data was compiled with the help from a good friend using the Thompson Innovation patent analysis tool during November of 2013.



- As of November of 2013, there were a total of 167 issued US patents with the phrase “cloud computing” in either the patent title, abstract or claims.
- IBM currently tops the list with 42 patents. IBM appears serious in securing its leadership in the cloud computing industry.

- Many well-known technology companies are seen in the graph. It is interesting to note that companies such as HP, AT&T, SalesForce and so forth are not found. Possible reasons include:
  - Most of their cloud computing patents don't have the phrase "cloud computing" in either the patent title, abstract or claims.
  - Their inventions are still in the patent application phase.
  - Number of patents they have are relatively lower.
- Excluding Sharp (Japan) and SAP AG (Germany), all of the companies listed in the graph are headquartered in the US. Cloud computing will likely be an important growth industry to the US economy.



- As of November of 2013, there were a total of 1,616 patent families with the phrase "cloud computing" in either the patent title, abstract or claims.
- Mr. Zong Cheng Li, who is a professor from Su Zhou University (information obtained from Baidu) tops the list with a whopping 957 patent families. This is astonishing, where a single inventor instead of a company is the owner for so many patent families. Most of the families probably consist of China patents.
- Compared to the other technology companies in Figure 1, IBM and Microsoft are the most aggressive in building a comprehensive cloud computing patent family.
- Most of the companies in Figure 2 are China and Korea based. The two countries appear to be aggressively seeking a firm foothold in the cloud computing industry.

- The huge gap between the total number of patent families (1,616 in total) and US patents (167 in total) show most of the patents in the patent families are being filed with non-US patent offices.

**Table 1: Top 6 IPC codes assigned to the patent families with phrase "Cloud Computing" in title, abstract or claims**

IPC Code	IPC code description	Number of Patent Families
H04L	Transmission of digital information, e.g. telegraphic communication	672
G06Q	Data processing systems or methods, specially adapted for administrative, commercial, financial, managerial, supervisory or forecasting purposes; systems or methods specially adapted for administrative, commercial, financial, managerial, supervisory or forecasting purposes, not otherwise provided for	488
G06F	Electric digital data processing	432
H04W	Wireless communication networks	8
H04N	Pictorial communication, e.g. television	7
G06N	Computer systems based on specific computational models	2

**Table 2: Top 10 IPC codes assigned to the US patents with phrase "Cloud Computing" in title, abstract or claims**

IPC Code	IPC code description	Number of US Patents
G06F 15/173	Using an interconnection network, e.g. matrix, shuffle, pyramid, star or snowflake	21
G06F 15/16	Combinations of two or more digital computers each having at least an arithmetic unit, a programme unit and a register, e.g. for a simultaneous processing of several programmes	17
G06F 9/445	Emulation; Software simulation	11
H04L 29/06	Characterised by a protocol	10
G06F 9/46	Multiprogramming arrangements	9
G06F 17/00	Digital computing or data processing equipment or methods, specially adapted for specific functions	8
G06F 17/30	Information retrieval; Database structures therefor	8
G06F 15/177	Initialisation or configuration control	5
G06F 11/00	Error detection; Error correction; Monitoring	5
G06F 7/04	Identity comparison, i.e. for like or unlike values	5

- Based on the data from Table 1 and 2, it appears the majority of the cloud computing patents are centered around the following three IPC codes:
  - **H04L (Transmission of digital information)**
  - **G06Q (Data processing systems or methods)**
  - **G06F (Electric digital data processing)**

## **Conclusion**

Needless to say, cloud computing will be a technology that will revolutionize our world. But to fully tap the cloud computing market potential, players will need a strong patent portfolio to both protect oneself and to attack any patent infringers. IBM seems to have established a good start in this respect (way to go IBM!). It is interesting to point out that although there has been a lot of talk regarding IBM vs Amazon in the offering of cloud services, patent-wise, the challenge from Microsoft should not be overlooked. Separately, a very surprising discovery from this research is the hundreds of patent families owned by Mr. Zong Cheng Li. It will be worth seeing how he intends to utilize these patent families. Will a wave of patent infringement cases be filed? Or will it bring forth the next wave of innovation? Let's wait and see.

All in all, I hope this article will help readers have a better understanding regarding the cloud computing industry from a "patent standpoint". Before I wrap up this article, I would like to extend my special thanks to Neo, Alston and Blanche for their help and input!