

CLOUD COMPUTING TECHNOLOGY TRENDS

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Summary: *Cloud computing has been a tremendous innovation, through which applications became available online, accessible through an Internet connection and using any computing device (computer, smartphone or tablet). According to one of the most recent studies conducted in 2012 by Everest Group and Cloud Connect, 57% of companies said they already use SaaS application (Software as a Service), and 38% reported using standard tools PaaS (Platform as a Service). However, in the most cases, the users of these solutions highlighted the fact that one of the main obstacles in the development of this technology is the fact that, in cloud, the application is not available without an Internet connection. The new challenge of the cloud system has become now the offline, specifically accessing SaaS applications without being connected to the Internet. This topic is directly related to user productivity within companies as productivity growth is one of the key promises of cloud computing system applications transformation. The aim of this paper is the presentation of some important aspects related to the offline cloud system and regulatory trends in the European Union (EU).*

Keywords: cloud offline, cloud computing, big data, cloud-based, web hosting

1. INTRODUCTION

Facilitating organizations to adopt and implement rapidly Big Data and cloud computing solutions, hardware companies have announced a number of important benefits of integrated expert systems families. Organizations that faces the challenges due to limited IT skills and resources, have now the ability to browse through massive amounts of data in the cloud [1] and to identify trends that could have a dramatic impact on the business.

Likewise, new created models helps to eliminate the complexity of developing cloud services, increasing the availability, implementation and management of secure the cloud environment [2]. Together, these actions extend its leadership expert systems integrated in the concept of Big Data in the cloud and next-generation technologies (the cloud system), while new opportunities are created in growth markets.

In every industry, and in all geographic areas, organizations of different sizes are challenged to find simpler and faster ways to meet customer needs better. Meanwhile, an IBM study found that nearly three quarters of the surveyed leaders indicated that firms they lead, had pilot programs, have adopted or substantially implemented cloud technology in organizations - and 90% expect to do the same in the next three years. While growth is high, many organizations do not have the resources or necessary skills to implement such technologies [1, 2].

2. OFFLINE SYSTEM

Offline is a subject of discussion from 2012, given that SaaS applications are available on the Internet, and there is a web format - HTML 5 - which is designed for this type of applications.

The reason is simple, namely that all the elements are now met: the ability to create, based on the same standard technology, the same application in the cloud with an offline version for the three main devices (computer, smartphone, tablet), for the main Internet browsers on the market and especially being able to distribute them on the web markets [3].

The case of using typical offline version is applied to users who travel frequently and experiencing interruptions of different Internet connections. The best example is the Commercial Officer using a CRM application (*Customer Relationship Management*) cloud system: accessible via the local network of the company, through the 3G network while on the move, the Wi-Fi at the railroad station or at the airport and finally the local client network, if it is available [3, 4].

However, the commercial officer could take the advantage of a long journey by plane or train, to update customer data. This is possible only if its CRM application is available offline. As soon as an Internet connection can be used, data will be synchronized with the app available in the cloud.

What is the mean of synchronized data? All changes made during the offline session are sent to the in the cloud hosted database, which will sync data with all other users. Each mobile platform have their markets - App Store for iPhone and iPad, Android Market (renamed Google Play) for Android smartphones. Web applications needed their own outlet, with a reserved area for offline community.

The Chrome Web Store market, launched by Google at the end of 2010, proposed from 2012 to all available cloud applications to indicate whether their application can be used offline. For example, the *New York Times* suggests an offline version of the website or news. However, in addition to a simple news site and its offline consultations, we may find Google Apps applications like Gmail, Google Calendar and Google Docs, which allows offline editing emails or documents, with data synchronization.

In 2012, at the Google I/O 2012 event, Google announced that Chrome browser has 310 million active users considering that at the end of 2011, the Chrome Web Store had slightly more than 30 million active users.

2.1. Offline systems technology

The number one technology of the offline system is HTML5 (*HyperText Markup Language 5*), the new Web main standard, compatible with the latest versions of all browsers in the market. Should be mentioned that the offline system is possible with HTML5, but is just one of the innovations that made possible this new format.

For integrating the offline mode, each browser integrates a first level of "*local cache*". This concept of "local cache" of the browser has always existed, starting with cookies. Afterwards, each browser called extensions or plugins specific and therefore proprietary.

What differs now is, on the one hand, the existence of true web standards for storing local data, but especially the exposure of these technical capabilities via an simple and standard API (*Application Programming Interface*) interface

2.2. Local Database

Local recording started with the *Application Cache* standard, which requires the recording of the application logic operation and the user interface. The next step is now possible, the recovery of new data generated by a user on his terminal and the local data registration.

There are several standards for local databases, the Web SQL being extensively used before being dropped by the W3C, the standardization body of the Internet. The good news is that the major browsers on the market announced that will support IndexedDB as the new standard for local databases. IndexedDB is compatible with Firefox, Chrome and Internet Explorer starting with version 10.

2.3. Detection and data synchronization

In addition to the availability of standards it is necessary to take decisions for the creation of an offline application. User information, concerning the detection of the offline system is the first functionality that must be implemented.

This first level of information is extremely important, especially if it is a collaborative tool, in which many participants have the possibility to change the same subject (eg. ongoing tasks for a client project).

This allows users to be informed of any recorded change, but without being 'immediately' visible by other users of the application, if they do not have the access to the Internet.

2.4. Collaborative applications in the Cloud

When the Internet connection is possible, it's time to sync with cloud-hosted database application. In the case of collaborative software, such as that proposed by GroupCamp, synchronization problem is different than in a personal application such as Evernote or Gmail, designed for a single user. The problem can be addressed in several ways:

1. Update all modified data.
2. The proposal for data synchronization, indicating to the user the number of elements (eg. new contacts created offline in a collaborative CRM application). The user can choose to continue or not the synchronization.
3. Authorize only the additions type changes: for example, the authorization of a commercial responsible to add information to a customer record, but when offline data are synchronized, the refusal to change the information in a client record by the commercial responsible, although information has been changed (this will prevent deletion of information). Alternatively, the refusal to change if an item has already been updated by another offline user.
4. For users to be informed about the synchronization and the gap that it creates it: users will be shown how an item was modified and how two dates will be retained - the date of the change performed by the user and date of effective synchronization. These dates are different for offline system.

According to the software tools, these several options must take into account, of course, the possibilities of the used device in terms of resolution and ergonomics, particularly in the case of smartphones and tablets (mobile versions is most often a functional subset of the database available in the cloud).

2.5 Using cloud at work

Almost three-quarters of IT professionals use cloud-based applications at work, security and cloud backup becoming increasingly frequent in companies. According to a survey [5], 70% of IT professionals use "web hosting cloud-based" applications, 60% of those using cloud-based security and 30% backup applications.

The most common application security is anti-spam cloud-based, 41% of respondents answering that currently use such an application, and another 3% stating that they intend to do so in the next six months. A total of 22% of respondents use antivirus cloud-based software, and 4% of them intend to do so in the next six months.

The benefits of placing security in the cloud are: do not require any special hardware to maintain them (76%), automatic software updates (63%), ease of administration (63%), low-cost set-up (41%) and combining many security measures alone (35%).

The study reveals that cloud-based backup will be adopted by 13% of respondents in the next six months. The survey also found that 19% of respondents plan to 100% online back-up data. A third of respondents (33%) stated that they store 1TB of data or more in the cloud.

The major concerns regarding the use of cloud backup are: high bandwidth requirements (59%), the risk of losing data/data breach (48%), lack of profitability (46%), lack of control over the infrastructure (42%), the risk of interruption or degradation of the service (33%).

Provocarea menținerii hardware-ului și software-ului specializat conduce, în mod clar, profesioniștii IT către aplicațiile IT cloud-based. Furnizorii care pot oferi capacitățile soluțiilor tradiționale hardware/software într-o modalitate rentabilă au o mare posibilitate de a răspunde nevoilor profesioniștilor IT.

The challenge of maintaining hardware and specialized software leads clearly the IT professionals towards the cloud-based IT applications. Suppliers that can provide the capacities of traditional solutions hardware/software in a cost effective way have a great possibility to meet IT professionals needs.

3. ERP MIGRATION IN CLOUD

Compare Business Products proposed recently a rescheduling of the most important aspects that may influence the migration to the cloud [6] ERP solutions:

- What are the IT expenses, compared to the needs, the size and the profile of the company? A poorly calibrated migration project may lead to higher expenses related to the administration of the existing system. The more a company has a specialized profile, it increases the complexity degree of the services that must be customized.
- How and how much we can control the accessibility? If in the case of *on-premise* models it was difficult to change a solution with a different one, at the time when certain limits are reached, SaaS platforms offer a wide flexibility that can be extended to the case of choosing the service provider.

- How much IT people have the necessary expertise? We shall admit that in many organizations IT specialist is seen only as the man who helps in changing printer toners or is responsible for the smooth running of the Internet. Any new technology needs to be doubled by additional qualification or specialization requirement, which most of the time means time and money.
- How specialized is the needed ERP solution and how long will take to implement it? SaaS solutions can be less flexible than classic ERP from the simple reason that a service is much harder to customize than software. Services are roughly the same for all. On the other hand, the need for a new rapid solution adoption, often recommends the adoption of SaaS modules, much faster for accessing and implementation.
- Can be made an upgrade or integration with existing ERP systems? If an application running on the same platform already exists, the integration of SaaS solution can be challenging. What SaaS vendors can not provide for combining on-premise applications with cloud services providers must be covered by *middleware* providers?

Despite the complexity of the situations and the large number of alternatives that we are tempted to try, the conclusion is one: any total or partial migration of an ERP solution in cloud should be based on a clear vision and a good knowledge of opportunities and real needs [7, 8].

3.1. Explosive IaaS grow on the Russian market

As shown in the study of consulting company *J'son & Partners Consultants*, IaaS market in Russia will grow rapidly in the coming years. It is estimated that IaaS segment will reach USD 920 million by 2016. *J'son & Partners consultants* presented current trends and forecasts for the IaaS on the Russian market, outstanding opportunities for both local IT service providers, but also for customers and partners who will implement these solutions.

In the All-over-IP Expo 2013 the presentation named "*Russia's IaaS market anticipating Explosive Growth*" was focused on the ways in which the implementation of the emerging technologies can be the best catalyst for a new business model and profit growth.

IaaS is practically delivered to customers / beneficiaries as a fully outsourced service including storage and hosting management as well as the development environments. The user can purchase those infrastructure services that meet the needs of business at any time this acquisition is required, as opposed to "buying" classic IT equipment and applications that requires time, investment and achieving full capacity utilization in much more time.

At this moment in Russia most of the companies have their own infrastructure, but this will change significantly in the next three years [9]. This change is due to the awareness of of cloud computing technologies advantages and benefits provided to clients, service providers and data centers. *J'son & Partners* company conference session brought to the attention of the audience, in a unique and interactive way, the education and the consultancy services but also and benefits of IaaS. By attending to this session, the audience (customers, experts, exhibitors, etc.) have added a valuable business experience.

All-over-IP Expo is an important event in Russia for global IT suppliers and vendors. The event that we refer to brought together the biggest international and global brands for opening the roads of the latest technology and innovation and for driving customers to what is called "*Next Big Thing*".

4. CONCLUSIONS

Social media, refocusing the technology toward end users and demographics data in continuous change, affect the way of working, forcing companies to find solutions to reduce the growing gap between organizational requirements and capabilities offered by traditional IT solutions. The current infrastructure administration model is outdated and cloud offline system represent a step towards the complete rethinking for approaching infrastructure management in data centers [9, 10].

The desire to offer the same user experience in the offline system, on main platforms, animated GroupCamp projects over the past few years, in the context of the debate about the performance of these new local database, when it comes to massive data management and replication across multiple terminals.

Another major topic, the ability to operate and maintain, for the same cloud application, different offline system administration behaviors, when moving from an iPhone to an Android smartphone.

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