International Journal of Scientific & Engineering Research, Volume 4, Issue 1, January-2013
ISSN 2229-5518

CLOUD COMPUTING: THE BASE OF FUTURE OPERATING SYSTEMS

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Abstract— History says, before 1950 people used some detached programs for different computations. After that, those programs with some new features were packed on a base and the first Operating System emerged. Though with the course of time many things have changed, that base is remained unchanged. So the question, at first, comes is: what is that base? Actually, that base is made of a bunch of things. The limited memory, limited processing power, limited space etc. make that base. Now it's the time to add a prefix: 'un'; so that everything would be unlimited. To keep pace with the fastest world it's the time to change the base and to introduce 'Cloud Computing' as the base of Operating Systems.

Index Terms— Cloud computing, Platform as a Service, Security, Hardware problem, Accessibility, Piracy, Reliability, Complex Architecture.

1 Introduction

Operating system, the soul of an electronic device, has been turned into a subject of great competition among the companies and of fascination among the techies. New operating systems are being developed by different companies while olds are getting updates. Mainly PC, Tablet and Smart phone OS are the talk of the time. As ecosystem of Operating Systems is now taking place, difference between PC, Tablet and smart phone is decreasing day by day.

2 Cloud Computing

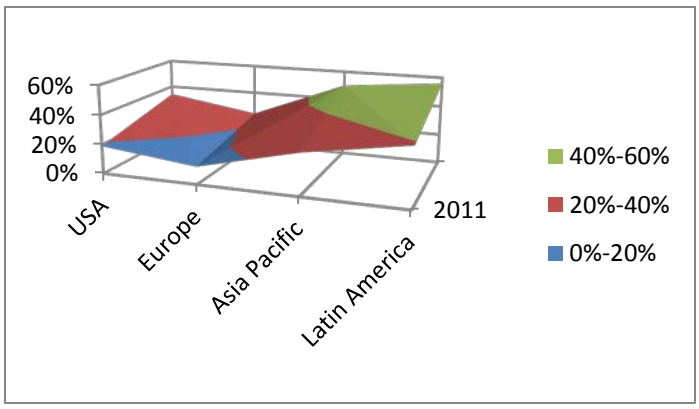
Now come to the word 'Cloud Computing'. Though it has become a buzzword in the field of technology, many people still don't know about it. But they are using it in almost every work they do in Internet. According to Wikipedia, "Cloud computing is the use of computing resources (hardware and software) that are delivered as a service over a network (typically the Internet)"[1]. Cloud computing services can be divided into those types:

1. Infrastructure as a service (IaaS)
2. Platform as a service (PaaS)
3. Software as a service (SaaS)
4. Storage as a service (STaaS)
5. Security as a service (SECaaS)
6. Data as a service (DaaS)
7. Database as a service (DBaaS)
8. Test environment as a service (TEaaS)
9. Desktop as a service (DaaS)
10. API as a service (APIaaS)
11. Backend as a service (BaaS)

3 Usages of Cloud Computing

Now-a-days most implementation of this is seen as 'Storage as a service (STaaS)' and 'Software as a Service (SaaS)'. Every tech giants are utterly trying to expand their efficiency and facilities through the power of cloud computing. SkyDrive of Microsoft, iCloud of Apple, Google Drive, Google Doc and other services of Google, Cloud Service of Amazon, Online Photoshop of Adobe, SCloud of Samsung and Nokia Air of Nokia are telling the future of computing. Here is a chart of the usage of cloud computing in the corporate world:

Corporate Applications: 2011 to 2014 (Projected)[2]



But this is not being used much as 'Platform as a service (PaaS)'. Though there are some Operating Systems based on cloud computing, none of these are complete operating system. Aliyun OS of Ali Baba is the world's first cloud computing based smart phone Operating System. For personal computer, there are more than 12 cloud computing based operating systems.

4 Common Problems of Current Operating Systems

Cloud computing can change our views towards Operating Systems. Almost every problems of computing can be made easy with this magical stick. So let's discuss the problems or shortcomings and their solution of the current Operating Systems. If we look at the current dominating OS like Windows, Mac or Linux etc., we can easily find out the regular problems that we face operating them. Mainly they are:

4.1 Hardware Problem

After a year our lovely PC becomes old and it cannot run latest OS because of its outdated and sluggish hardware. So if it's desktop, we can change the hardware. So we are compelled to buy a latest one in exchange of a smart amount of money and almost every year we have to do so. Again, every OS is designed for specific hardware; normally you cannot run Mac in iPhone or iOS in Mac book. So an ecosystem is not possible though now-a-days Microsoft is trying to make it possible through their Windows 8.

But in cloud computing, hardware will be like elastic. So, you can expand tour devices' computing power without changing the hardware. You can enjoy the speed of a latest superfast computer with your backdated smartphone. So, here in the world of cloud computing dream is a reality. You can even run Mac on a Symbian Smartphone!

4.2 Data Loss

None can be found who never loss any data in his computing life. Though sometimes it can be found by utilizing 'Signature Search' or other technologies, most of the time it doesn't work[3]. Again 'File corrupted' is a common error in every OS for different reasons. Thus sometimes our losses become greater than our expectation. According to CWD, "IT Security Decision-makers have selected 'Data Loss' as the next big threat"[4].

On the other hand, in cloud computing losing any kind of data will be a history. Your data will be safe and easily accessible from anywhere. So, people need not to worry about their valuable data.

4.3 File Transfer

By whatever means we try to send files to wherever, we will find it slow. But current world wants super-fast reliable medium. Let me explain this. Normally we use two kinds of medium for the purpose:

i. Hardware: like pen drive, DVD, hard drive etc.
ii. Network: like Bluetooth, Wi-Fi, NFC, Internet etc.

Network transfer, especially through internet or Wi-Fi, is always speeder than the hardware transfer. And most importantly it's reliable.

In cloud computing files are transferred though internet. In this case, file transfer will be a pleasant task. For example, if you want to send a video sized 1 GB to your friend living another country first you have to upload 1 GB data then send it to your friend. But in cloud computing, just send!

4.4 Security

Until now various kind of security has been invented to secure users. But none can disagree that they are totally successful. Hackers know how to break them. They are coding new virus, Trojan, worm and malicious software. Again every user is not equally concerned about their security, and as a result they become prey of the hackers.

On the other hand, security can be ensured centrally in cloud computing. So, users do not have to be worried about their security.

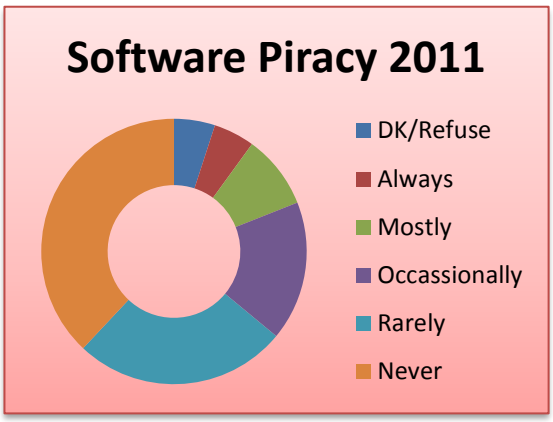
4.5 Accessibility

Accessibility is an important issue now-a-days. People not only want to access their files remotely but also want their ever-known environment of their OS. They just want the easiest and dynamic environment which is not possible with the current Operating Systems.

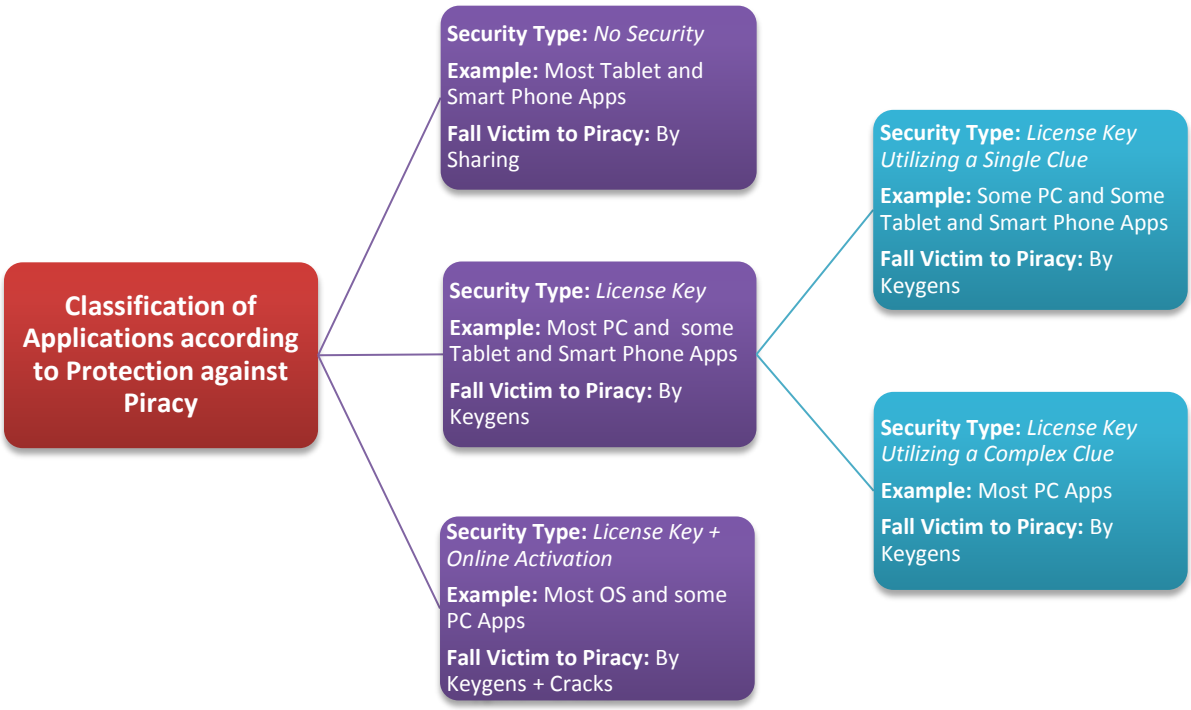
By providing accessibility from anywhere and the ever-known environment, cloud computing based operating systems can be the only choice of the future generations.

4.6 Piracy

Piracy has been turned into a great concern not only in software industry but also in movie, music and other industries. When the security giants like Symantec, Kaspersky, Avast etc. fall victim to this, nothing is remained to say. Let's look at the world renowned BSA Global Software Piracy Study which says 42 % of software fall victim to piracy which worth $63 Billion. Here's the details[5]:



I have tested thousands of software to find their security strength and procedure of keeping themselves from piracy. Now-a-days almost every paid application has its own process to secure itself from piracy. Normally paid application can be classified as bellow regarding that:



In the world of cloud computing, piracy will also be a history. Software will be available to those accounts which have paid for the software. So, no chance for piracy; just the easiest solution!

4.7 Backup Problem

Backup and Restore are two familiar words though they are painful tasks. Uploading data to remote servers or backing up them in portable devices are disgustful tasks to many of us. And most often it does not work properly.

How it would be if anybody would never need to back up their data? A small example regarding this: Let your computer has been crashed and you have lost everything. Now when you install Google Chrome and sign in with you Google account, you will find all of your bookmarks, settings, history… in a word everything. But if you install other browsers like Mozilla Firefox or Internet Explorer, you will get nothing. So what people will chose?

4.8 Update and Upgrade

Almost every day after starting PC or Smart Phone generally we found at least one update. If Internet speed is horrible, it turns into a painful job. Again it takes much time to install which is not tolerable at the time of work as it makes the computer slow and most of the times restart several time. And if we ignore the updates, we may fall victim to security threats. Firmware upgrade is also a painful task. Buying DVD or downloading, installing… lots of stuffs.

In a cloud computing based Operating System, the software and firmware will be updated automatically in the server. Users need not to do anything!

4.9 Resource loss

Let's take the example of an organization which will undertake a complex experiment. In order to analyze data a super computer and some highly paid professional software are needed. This kind of problem is prevailed everywhere, just not only in that organization. But generally those highly paid equipment will not be used after the task. So there is a huge loss of resource.

But if the OS is cloud computing based, the organization can rent some processing power, memory, space and even the professional software with about 50% cost of the usual way for the experiment. So, what is better?

4.10 Power Problem

Power failure is not an uncommon matter in most countries of the world. That can lead serious data loss or hardware conflict. Again sometimes some task like video editing or analyzing complex data need a lot of time but it can be done within a short time with a high end computer. Here a huge power can be saved by performing the tasks in cloud.

5 Endless Possibilities of Cloud Based OS

Now we have perceived that the prevailing problems of current operating systems can be solved with the help of cloud environment. If we pack the elements of current personal computers on the base of cloud computing, a new era will begin. This innovation will change our outlook about an Operating System. About this Google's Engineering Director Alan France Winner told the Sydney Morning Herald, *"The*

future of the operating system would be an excellent opportunity to adopt cloud computing"[6].

According to Rosenberg and Mateos (2011), *"Platform as a service (PaaS), and its relevant frameworks, will be the dominant method of application development in ten years. In the cloud, the web browser will function as the operating system, while the cloud infrastructure will provide applications, computing power, and storage. Users will utilize platforms served on the cloud to develop their own specialized applications as mashups, or combinations of application components. Mashups will be the key to the computing activity of developers and users in the cloud future. Out of 10 predictions for application development in the cloud, 6 involve the creation and deployment of mashups as a function of PaaS (Rosenberg and Mateos, 2011)"*[7].

6 Future Challenges

But there are some challenges which we have to pass to make this innovation successful. Those challenges are:

6.1 Reliability

In cloud computing user security is always a concern. Users store their data in remote servers but they do not know whether their data are accessed by anyone or not: there is always an anxiety.

To eradicate the anxiety of the customers, I think, trustworthiness is the only solution. We have to trust our email service providers though we have secret information stored in our email account.

6.2 Network Stability

Internet connection is not always stable. Sometime we have to face some network issues. That may cause serious problem in for the users.

Though a significant evolution in network is going on, stability should be ascertained. This will render immense success to future cloud computing powered operating systems.

6.3 Lack of Control

Sometimes data may be changed in the server without the permission of the user. This may need rechecking data in an interval of time: a disgusting task.

Researcher should find a proper solution of this problem otherwise this may be the main deterrent to the successful procession of cloud computing.

6.4 Complex Architecture

For providing high-end facilities, next generation cloud computing architectures should be more effective and complex. But according to many scientists, this may create a new problem of maintaining the huge structure[8].

But this is not a valid argument as new technologies are being invented to maintain more huge and complex structures like Large Hadron Collider; so why not a complex server?

7 Conclusion

To conclude, though there are some unsolved problems regarding cloud computing, after all it will dominate the next century by powering the super-fast platforms from which not only the enterprises but also the normal users will get the opportunity to taste the power of a super computer. Those Operating Systems will work as a browser while software will be accessed through internet: nothing else!

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