

Social Impact of Privacy in Cloud Computing

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About today

- **Social considerations under a philosophical perspective**
- **Not a technical view**
- **Reflection**

Agenda

- **Cloud Computing definition**
- **Privacy and Freedom**
- **Implications to privacy and freedom of speech**
- **Conclusions**

Cloud Computing definition

Cloudy definition?

- **How do you explain it?**
- **Consensual definition?**
- **Ambiguity around the concept**
- **Complex and difficult to understand**
- **Influence several aspects of our society**
- **it is important to present the concept in a way that legislators, politicians and intellectuals can easily understand**

What is Cloud Computing?

- **Starting by the words Cloud and Computing**
- **Maybe it is related to computing information using the internet ?!?!**

What is Cloud Computing?

- **Cloud computing is not a particular technology, but a model where the most computation is beyond the organization's firewall and uses internet shared computer resources on a pay per use basis**
- **With this paradigm shift, companies will have the opportunity to dynamically scale their hardware and software requirements in a more efficient way**

Definition

- **National Institute of Standards and Technology**
- **The specific concept and their requirements are continually evolving and there is no concise universal definition**
- **Relevant document with the five main characteristics, possible delivery and possible deployment models**

NIST definition: main characteristics

- *on-demand self-service*
- *ubiquitous network access*
- *location independent resource pooling*
- *rapid elasticity*
- *pay per use*

NIST definition: delivery models

- ***Cloud Software as a Service (SaaS)***
- ***Cloud Platform as a Service (PaaS)***
- ***Cloud Infrastructure as a Service (IaaS)***

NIST definition: Deployment

- ***Private Cloud***
- ***Community Cloud***
- ***Public Cloud***
- ***Hybrid Cloud***

The Cloud Computing paradigm

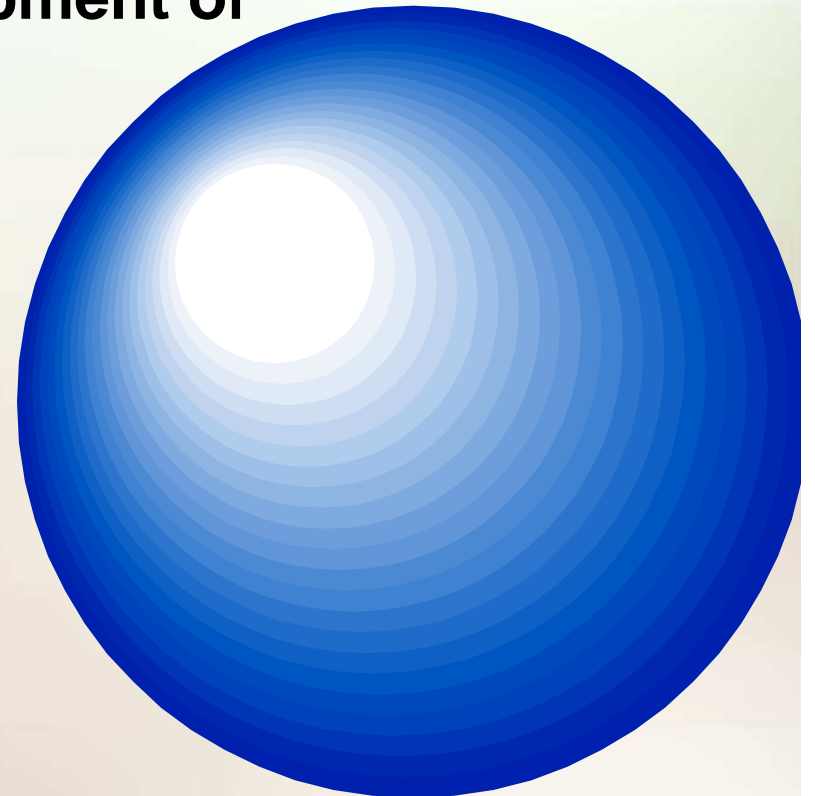
- **Relies in the use of several technologies**
- **Some have been developed and implemented in the IT field earlier than the Cloud Computing concept**
- **It seems to be perceived as a symbol of technological advance and connected with prestige**
- **When we use the technologies are we following the paradigm?**
- **Buzzword**

The background features a smooth color gradient transitioning from light blue on the left to bright yellow on the right. A thin, curved line starts from the left edge and arcs across the middle of the frame, creating a sense of depth and movement.

Privacy and Freedom

Privacy

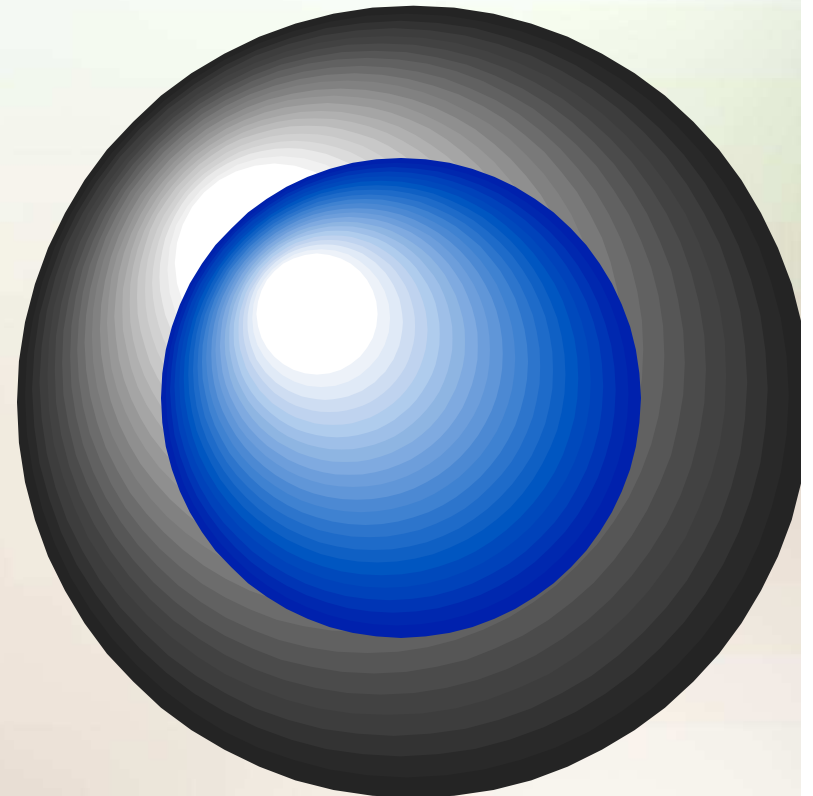
- Free from others interference
- Decide when, how and extend is our information reveled
- The control allows the person to maintain varying degrees of Intimacy
- Essential for the development of Love, friendship and trust



Privacy

- **Criminals**
- **example 'identity fraud' criminals, stalkers and rapists**
- **exploitation of personal data for marketing purposes and to be used for discrimination purposes**

Coercion



Privacy

- **Nissenbaum three principles – definition of the sphere boundaries:**
 - (1) **limiting surveillance of citizens and use of information about them by agents of government**
 - (2) **restricting access to sensitive, personal, or private information**
 - (3) **curtailing intrusions into places deemed private or personal**
- **To guarantee a satisfactory level of privacy any new technology should take these principles into consideration. Otherwise, the users might mistrust it**

Freedom

- **The state of not being imprisoned, enslaved or constrained**
- **We are born free and part of our individual freedom became sacrificed in order to live in a community**
- **Through a regulation of rights and duties**
- **To serve a public utility, which is considered more important than the individual**
- **Imperfections as social beings and the way we relate to each other**

Freedom

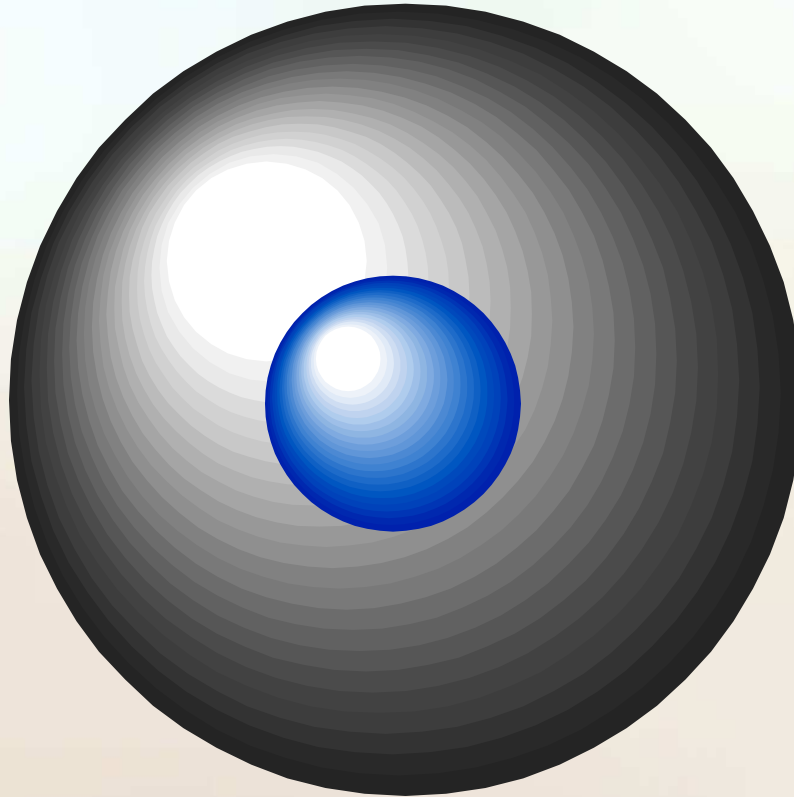
- **Franklin D. Roosevelt distinguished:**
 - **freedom of every person to worship God in his own way**
 - **freedom from want**
 - **freedom from fear**
 - **freedom of speech and expression**

Freedom

- **More harmonic society from equilibrium between the reduction of the individual sphere and the public utility**
- **Delicate balance can degenerate into a simple lost of privacy with no increase in public utility**

Freedom

- **Having excessive control over privacy can reduce the freedom**





Implications to privacy and freedom of speech

Implications to privacy and freedom of speech

- **Carr - an interesting analogy between the electricity and computing**
- **In the electricity's early days, industries had to build their own power sources**
- **To be productive a factory had to be in the energy business as well**
- **Electric grid, each factory plugs into the grid and stops investing on expensive and less efficient power systems**
- **Carr explored analogies**

Implications to privacy and freedom of speech

- **Both Electricity and Computation involves streams of electrons**
- **Difference between the ways they are organized and what they constitute**
- **A stream of electrons in electricity means a certain quantity of electric power**
- **Electric current can be seen as generic**
- **One ampere of electric current has always the same physical characteristics and possible uses, independent from who generates it and the purpose**

Implications to privacy and freedom of speech

- **There are no big concerns between confidentiality and electricity, but there might be with computation**

Implications to privacy and freedom of speech

- **Cloud providers argue that it will constitute a better overall security**
- **The information will become more centralized and cloud providers could invest more money in security systems**
- **Google attacks from China**

Implications to privacy and freedom of speech

- **The first Nissenbaum principle can be threatened on a Cloud Computing paradigm**
- **When something fails it can promote the degradation of freedom of speech**
- **The problem may become stronger if we contribute to centralize information into a lower number of systems**
- **political pressures**
- **terrorists' organizations**
- **oppressive governments to control and monitor their citizens' actions**
- **military targets**

Implications to privacy and freedom of speech

- **Enough technology to provide complex and sophisticated data encryption**
- **Premise that there is no computer power to discover the key or crack the algorithm in useful time**

Implications to privacy and freedom of speech

- **New generation of cyber pirates and an increase need of computer's security level**
- **The processing power to ensure new security standards will need to increase on both Client and Provider side**
- **The privacy of those who cannot afford the update may become degraded**

Implications to privacy and freedom of speech

STACKSMASHING.NET

DAMN, IT'S ABOUT COMPUTERS!

HOME IMPRINT

15
NOV/10

89

Cracking Passwords In The Cloud: Amazon's New EC2 GPU Instances

Update: Great article about this at [Threatpost!](#) This also got [slashdotted](#), featured on [Tech News Today](#) and there's a [ZDNet](#) article about this.

Update: Because of the huge impact I have clarified some things [here](#)

As of today, [Amazon EC2](#) is providing what they call "Cluster GPU Instances": An instance in the Amazon cloud that provides you with the power of two NVIDIA Tesla "Fermi" M2050 GPUs. The exact specifications look like this:

- 22 GB of memory
- 33.5 EC2 Compute Units (2 x Intel Xeon X5570, quad-core "Nehalem" architecture)
- 2 x NVIDIA Tesla "Fermi" M2050 GPUs
- 1690 GB of instance storage
- 64-bit platform
- I/O Performance: Very High (10 Gigabit Ethernet)
- API name: cg1.4xlarge

GPUs are known to be the best hardware accelerator for cracking passwords, so I decided to give it a try: How fast can this instance type be used to crack SHA1 hashes?

Using the CUDA-Multiforce, I was able to crack all hashes from [this](#) file with a password length from 1-6 in only 49 Minutes (1 hour costs 2.10\$ by the way.):

```
1 Compute done: Reference time 2950.1 seconds
2 Stepping rate: 249.2M MD4/s
3 Search rate: 3488.4M NTLM/s
```

Implications to privacy and freedom of speech

- **Trust?**
- **Chain of providers**
- **Two issues arise: the user might not trust one of the subcontractors, and might lose track of those whom had contact with the data**
- **Sensitive data such as medical, judicial and banking**
- **What if one of those “hidden” links is in a country with a different privacy policy that is less protective?**
- **When these kinds of decisions are made without the client’s acknowledgment, one can lose control of privacy**

Implications to privacy and freedom of speech

- **We may trust our provider and believe it will no misuse the data**
- **What if the new buyer is our business competitor or is under a different juridical system?**
- **What if the provider went bankrupt?**

Implications to privacy and freedom of speech

- **Coghead**
- **A web based service for building and host customizable online database applications (*PaaS*)**
- **Bought by SAP**
- **What if one of Coghead's clients was a SAP competitor with a new revolutionary CRM application?**
- **MediaMax also known as Linkup deleted 3.5 million user accounts and files from their cloud service**

Implications to privacy and freedom of speech

- **Accidents can happen in all systems and it occurs in traditional systems as well**
- **Companies can have more control over the quality of their own IT department then when delegating to other companies**

Conclusions

- **Cloud Computing can provide economical and technical advantages**
- **It can leverage serious risks regarding the privacy and consequently the freedom of speech**
- **The provider should clarify where the data will be stored, which parties will be involved and under which legal system**
- **Our society should avoid the centralization of information on few Cloud Providers**
- **The success of the Cloud paradigm is dependent on the development of conditions for trusting it**