Social Impact of Privacy in Cloud Computing

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About today

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• Not a technical view
• Reflection
Agenda

• Cloud Computing definition
• Privacy and Freedom
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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
Privacy and Freedom
Privacy

• Free from others interference
• Decide when, how and extend is our information revealed
• 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

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):
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