The Open Source Community for Infrastructure Software

Technologies for cloud services that protect privacy, data integrity and digital identity by design

DG CONNECT, Unit "Cloud and Software": Consultation on Cloud Computing
Research Innovation Challenges for WP 2018-2020

Contribution by

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Outline

- Context
  - Why we should consider protecting privacy, data and digital identity *by design*
- Technologies
  - Three key technology areas that deserve EU attention – and money ;)
- Work programme
  - Not only technologies but also people...

Context:
The Human Factor

Irrationality
Information asymmetry
Public Regulation?
Change agents

User behavior is plagued by...

Irrationality

- Do not count on users doing what is in their best interest.
- Users, consumers are often irrational
  - Even professional buyers
- Think: drinking, smoking, driving, eating, buying, etc.

- *"I've hacked your accounts, I know where you are."*
- *"Many recipients just went on surfing"*

Information asymmetry

...works in favor of vendors

- Vendors have more information
  - If cheating is possible they will
  - Also called “Market imperfection”
- Think: second hand car, pharmaceutical, financial products...
  - *“Basically the result of this is that users will adopt whatever technology is put in front of them because they don't know its full costs and therefore it is society's obligation to help protect them?”*

https://commons.wikimedia.org/wiki/File:Kovacs_special_1968.JPG
https://www.flickr.com/photos/127619525@N05/15075074577
https://pixabay.com/fr/d-affaires-hommes-d-affaires-1320058/

Can this be fixed through:

Public regulation?

European Commission

Establishing a Trusted Cloud Europe

A policy vision document by the Steering Board of the European Cloud Partnership

هيئة الاتصالات وتقنية المعلومات
Communications and Information Technology Commission

Public Consultation Document on the Proposed Regulation for Cloud Computing

Issued by CITC on July 2016

- “However, we do not believe that a stand-alone cloud regulatory framework is necessary to address these concerns. (…) Customer education is the single most important element of a program to drive cloud confidence.”

BSA The Software Alliance

Trusted Cloud Europe

Response of BSA| The Software Alliance

http://www.citc.gov.sa/en/new/publicConsultation/Pages/143703.aspx
http://www.bsa.org/country/~/media/Files/Policy/SoftwareInnovation/cloud/TrustedCloudEuropeconsultationBSAresponse.pdf
file:///OW2/_7-CommunityMissions/BRUSSELS-1609-10-11/1611-BRU-CloudWkshp/pics/TrustedCloudEurope.pdf

Change Agents

Better laughter through electronics: Steven Jobs (left) and Stephen Wozniak examine their latest creation.

- Silicon Valley did begin as a an open and agile culture of hackers and tinkerers based around UC Berkeley and Stanford.
  - Every attempt at replicating Silicon Valley so far has failed, every time we try to emulate what it is today without recognizing where it began.
- An "intolerant minority" (only 3-4%) can dictate the preferences of an entire population (Nassim Taleb)
  - The intolerant minority of privacy and security conscious individuals and businesses will shift the market

https://farm6.staticflickr.com/5183/5684907691_266b871166_z.jpg
https://jimsworldandwelcometoit.files.wordpress.com/2012/12/jobs-and-wozniak.jpg

Technologies: Back to (Internet) Basics

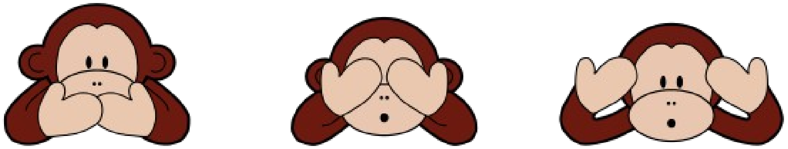
End-to-End Encryption
Zero-Knowledge Cloud Services
Protocol-Based Architectures

End-to-End Encryption

- Definition
  - Encryption which protects messages from all of the intermediary servers between their origin and their destination
- Relevance
  - 20 years ago, HTTPS was considered by the US government to be a munition, now it is a basic pillar of e-commerce.
  - E2EE will be a key enabler of new services and new architectures.
- Challenges
  - Multi-party key agreements
  - Proxy recryption

https://www.flickr.com/photos/111692634@N04/11406975556 - www.bluecoat.com/
https://www.flickr.com/photos/ideonexus/5175383269

Zero-Knowledge Cloud Services

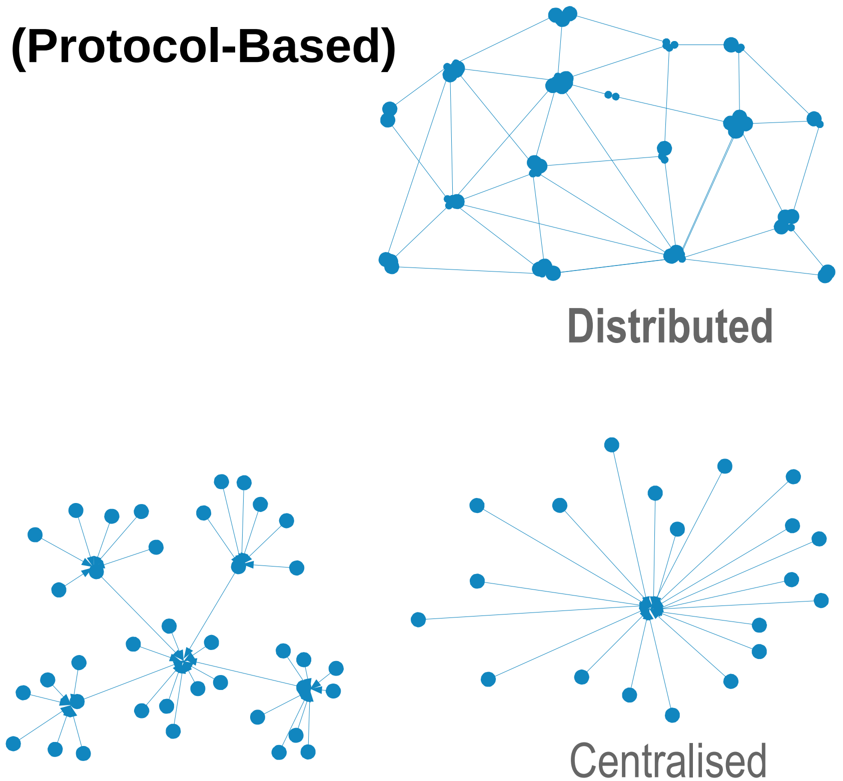


SPIDEROAK tresorit

https://upload.wikimedia.org/wikipedia/commons/thumb/d/df/ThreeWiseMonkeysOriginal.svg/598px-ThreeWiseMonkeysOriginal.svg.png

- Definition
  - Zero Knowledge Cloud Services are services which use End to End Encryption to make themselves **blind to the data which they host**
- Relevance
  - Zero Knowledge Cloud Services can uniquely provide the benefits of the Cloud with the auditable security of the client side (cryptographic) software
- Challenges
  - Operations on hosted data
  - Homomorphic encryption
  - Order preserving encryption
  - Substitution cyphers

Protocol-Based Architectures



(Protocol-Based)

Distributed

Decentralised

Centralised

(Platform-Based)

- Definition
  - Protocol-Based Architecture are **distributed** with no dependence on a central server.
- Relevance
  - Protocol-Based Architecture is about avoiding value capture by monopoly-oriented platforms and building the next generation internet services (incl. IoT) around **open protocols implementing the peer-to-peer paradigm.**
- Challenges
  - Blockchain processing issues
  - Self hosting paradigm
  - Modeling, code-ification of trust
  - Protocol standardisation

Work programme: Technologies and People

Perspectives
“Technology” objective
“People” objective

Perspectives

- “By design” perspective
  - *“Users are irrational; Expertise asymmetry works in favor of vendors; Public regulation will not be accepted; Privacy and security should be enabled by design."*

- “Activist” perspective
  - *“Rent-based monopolies didn't create Silicon Valley; The future is bottom-up, participatory and open source; Encryption is critical to business; A healthy active minority will shift the market.”*

“Technology” objective

- “By design” perspective:
    - *“Users are irrational; Expertise asymmetry works in favor of vendors; Public regulation will not be accepted; Privacy and security should be enabled by design."*

- Help develop technologies for cloud services that protect privacy, data integrity and digital identity *by design*:
    - **Protocol-Based Architectures**
    - **End-to-End Encryption**
    - **Zero-Knowledge Cloud Services**

“People” objective

- “Activist” perspective:
  - *“Rent-based monopolies didn't create Silicon Valley; The future is bottom-up, participatory and open source; Encryption is critical to business; A healthy active minority will shift the market.”*

- Foster through research grants and other means a **European hacker scene** to rival the hacker/geek scene which lead to Silicon Valley.
  - Facilitate agile transfers between European hacker communities and startups and SMEs
  - Support developers' communities, OW2! ;-)
  - Support hacker-oriented events, hackathons, etc.

Thank you

And now let's talk

- Q&A
- Disagreements
- Complements
- Feedback
- etc.