Consequences of cloud computing

Possible concerns:

* Some areas can have poor connection as they are very far from any data centre
* They could get bombed
* Steal data
* Birds

We, being computationally literate, need to take responsibility.

Privacy – the ability to control information about oneself.

Who could have access to the data?

A diagram of a cloud

Description automatically generated

Cloud provider controls:

* Hardware
* Network
* Possibly software stack

Other Tenants:

* Co-located on same hardware
* Not authorized access
* But, may perform Virtual Machine Escape attack

Data centre Operators:

* Operate hardware
* And network infrastructure

Privacy and data location

* General Data Protection Regulation (GDPR)
  + About the data subject (EU citizens)
  + Data controllers (collecting data) and data processors subject of law
  + Independent of location of data
* But,
  + Subjects (i.e. users) need to be informed for instance if their personal data is transferred outside of the EU
  + Fine of up to €20 million or up to 4% of the annual worldwide turnover

A close-up of a sign

Description automatically generated

Ethics vs Laws

* Collecting data can be unethical, however it can be legal
* End to end encryption of messages sounds ethical but is illegal in some countries

Security principles to be considered:

Cia Principle

* Confidentiality (secrecy):  
  Keeping the information secret, even when unauthorised access might have taken place
* Integrity (accuracy):  
  Protecting against forgery or tampering
* Availability:  
  Keeping information and services available for access or use

Other concerns:

* Authenticity: Confirming the source of the information
* Non-repudiation: Avoiding denial or disowning of a contract

Confidentiality:

Data accessible only by authorized people

Storage is secured against

* Unauthorized access
* Data leakage
* Protected with access control, or encryption

Data transfer is protected

* Using appropriate encryption technology

Authentication:

* Based on knowledge
  + Passwords
  + PINs
  + Security questions
* Based on ownership
  + Passport
  + ID card
  + Security token
  + Digital signature/certificate
* Based on biometrics
  + Fingerprint
  + Retina scan
  + Facial recognition

Environmental concerns:

Global energy use increases every year with networks having the biggest use

Close to 100% is turned into heat

* Google’s Data centre in Finland uses seawater cooling to minimize cost

Is cloud computing more environmentally friendly and sustainable?

Environmental impacts:

Why could there be benefits?

* Economic pressure to minimize costs
* More flexibility to minimise powered-up, but idle hardware
* More specialised personnel
* Scale allows investment in research

What are possible Drawbacks?

* Large-scale data centres may require more cooling
* May use old inefficient hardware
* Less control, suboptimal choices for special cases
* Virtualisation can cost performance/energy