

## Science 1000: Part #5 (Wareham):

### Where We Are: Big Data and Online Privacy

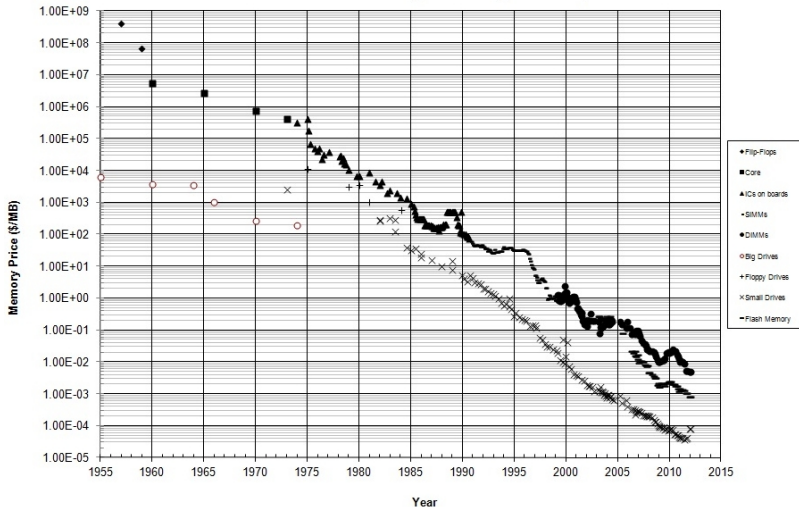
THE EVOLUTION OF STORED DATA

THE EVOLUTION OF PRIVACY

PROTECTING YOURSELF ONLINE

# The Computer Memory Cost Implosion

Historical Cost of Computer Memory and Storage



## The Evolution of Stored Data

local	⇒	networked / distributed
use-specific	⇒	detailed / overall
short-term	⇒	(very) long-term
user-accessible	⇒	anyone-accessible
bulky	⇒	(very) portable
one copy	⇒	(very) many copies
hard to copy	⇒	(very) easy to copy
authority-verified	⇒	anyone-verified

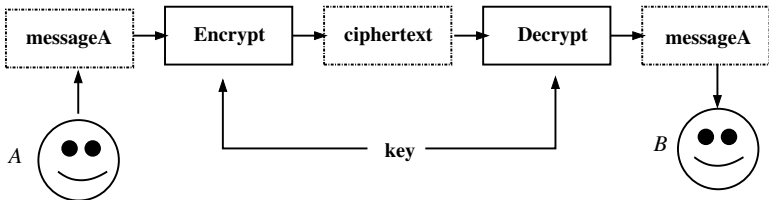
## Stored Data: Joys and Perils

<b>Joys</b>	<b>Characteristics</b>	<b>Perils</b>
		Store false / misleading easily
Store anything easily	Storage easy	Find false / misleading easily
Find anything easily	Storage easy	Integrate / reconstruct easy
Spread anything easily	Store anything	Steal anything easily
Everything remembered	Store anytime	Spread impossible to stop
Personal customization	Store forever	Nothing forgotten
		Personal commercialization

- Appropriate governance and laws are critical in mitigating the perils above; so is responsible behaviour by people.

# Cryptography: A Privacy Survival Tool

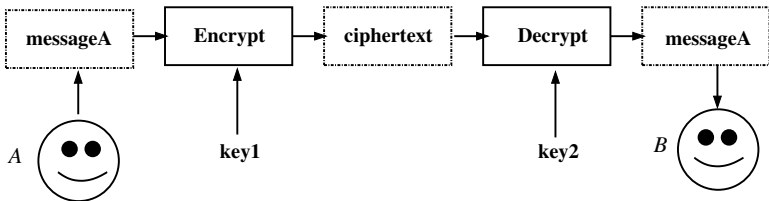
- Protect personal data and identity using cryptography.
- Symmetric (one key) cryptography:



- Pros:**
- Computationally quick
  - Provably uncrackable in certain situations
- Cons:**
- Key can be stolen / deduced
  - Available software may be compromised by national security agencies

## Cryptography: A Privacy Survival Tool (Cont'd)

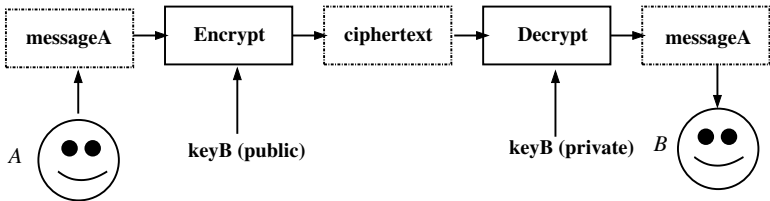
- Asymmetric (two key) cryptography:



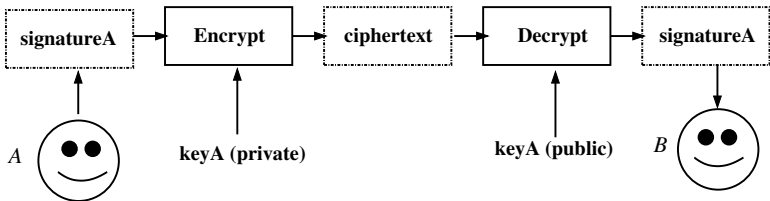
- Pros:**
- Provides secure messages and signatures
  - Not impossible but very hard to crack
  - Much software available
- Cons:**
- Computationally more expensive
  - Keys can be stolen / deduced
  - Available software is often illegal

## Cryptography: A Privacy Survival Tool (Cont'd)

- Secure messages (encrypt message with B's public key):



- Secure signature (encrypt signature with A's private key):



## Surviving and Thriving with Big Data

- Learn crap detection and online research skills (Rheingold)
- Limit degree of personal (esp. commercial) exposure online
  - Know privacy settings and use appropriately
- Limit types of personal exposure online
- Use encryption where possible (and legal)
- Update your computing devices with security fixes regularly
- Be aware of what's going on privacy-wise both technologically and commercially

“Don't Panic” – *The Hitchiker's Guide to the Galaxy*

“Let's be careful out there” – *Hill Street Blues*