Digital Forensics

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Digital Forensics Course Concept

Marian Svetlik

- Expert Witness in Digital Forensics
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- ISMS Lector at University of Economics Prague
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- Cybercrime Lector at CEVRO Institute
- Digital Forensic Special Expert C4e at MUNI
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- IDFA Management Board Member

Course Content

- DF definition, relation to the cybersecurity and to the cybercrime
- Digital Traces & Digital Evidence, properties, documentation
- Sources, Handling, Gathering and Protection
- DF Examination Principles
- DF Lab creation and management, Assessment, Certification, Accreditation
- DF in Law, Electronic Evidence

Recap

- Digital Trace
  - Immaterial
  - Latent
  - Coded
- Digital Trace
  - Seizable
  - Understandable
  - Relevant
- Locard's Principle in Digital World
- Digital Traces and their properties

Today outline

- Typical sources of the digital traces
- Digital evidence gathering, handling and protection

Typical Sources of the Digital Traces

Starting with Theory:

- Digital information is the record of (immaterial) information in digital form **on a material medium that is capable of carrying or transmitting such kind of record**.

Where they are?

- Integrated
  - Permanent (static)
  - Volatile (dynamic)
- External/Removable
- Remote
  - Local network storage (file server, NAS)
  - Cloud storage
- Data lines (dynamic)
  - Electric current/wires, light, el-mag filed, ….

1st Break

- Is there some difference between:
  - Local network storage
  - and Cloud?

Integrated static

- HDD

Integrated static

- SSD

Integrated static

- SSD

Integrated static

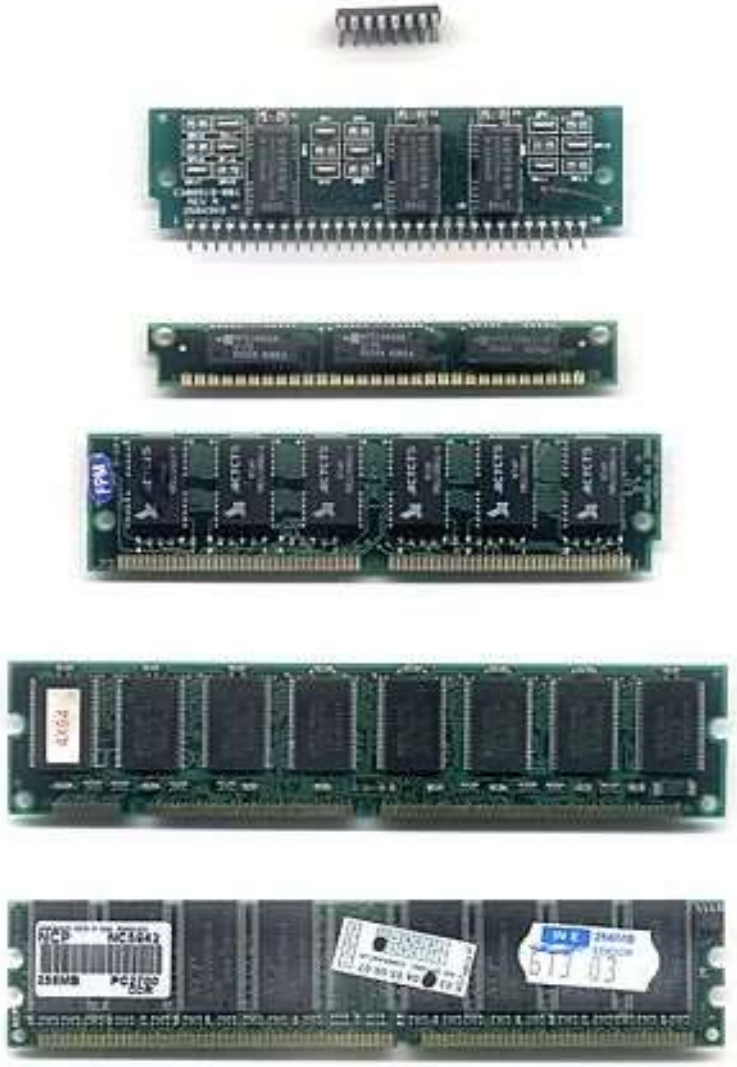
- SSD

Integrated Volatile

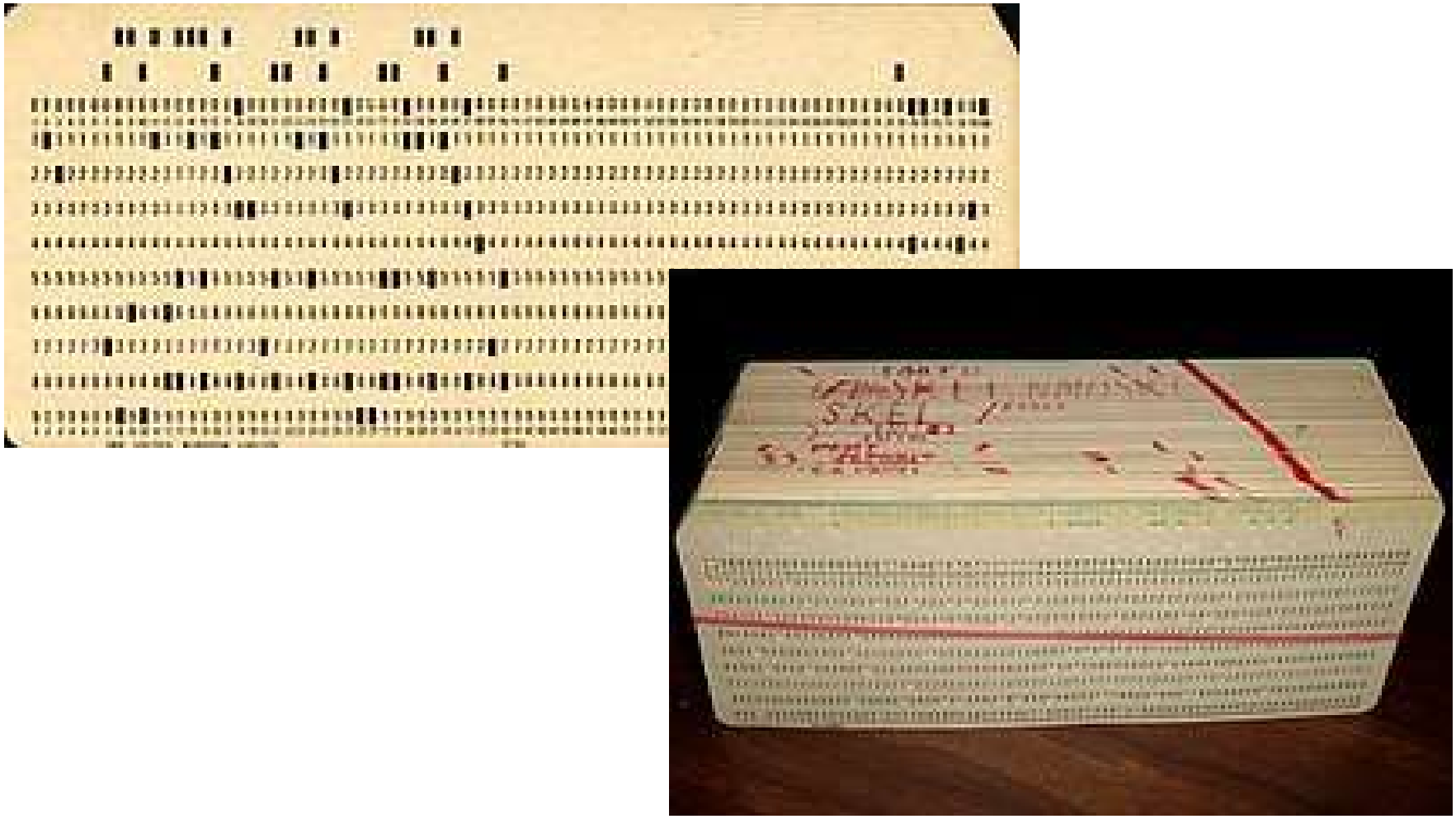
- RAM (Random Access Memory)
  - SRAM (static)
  - DRAM (dynamic)

Integrated Volatile

- RAM



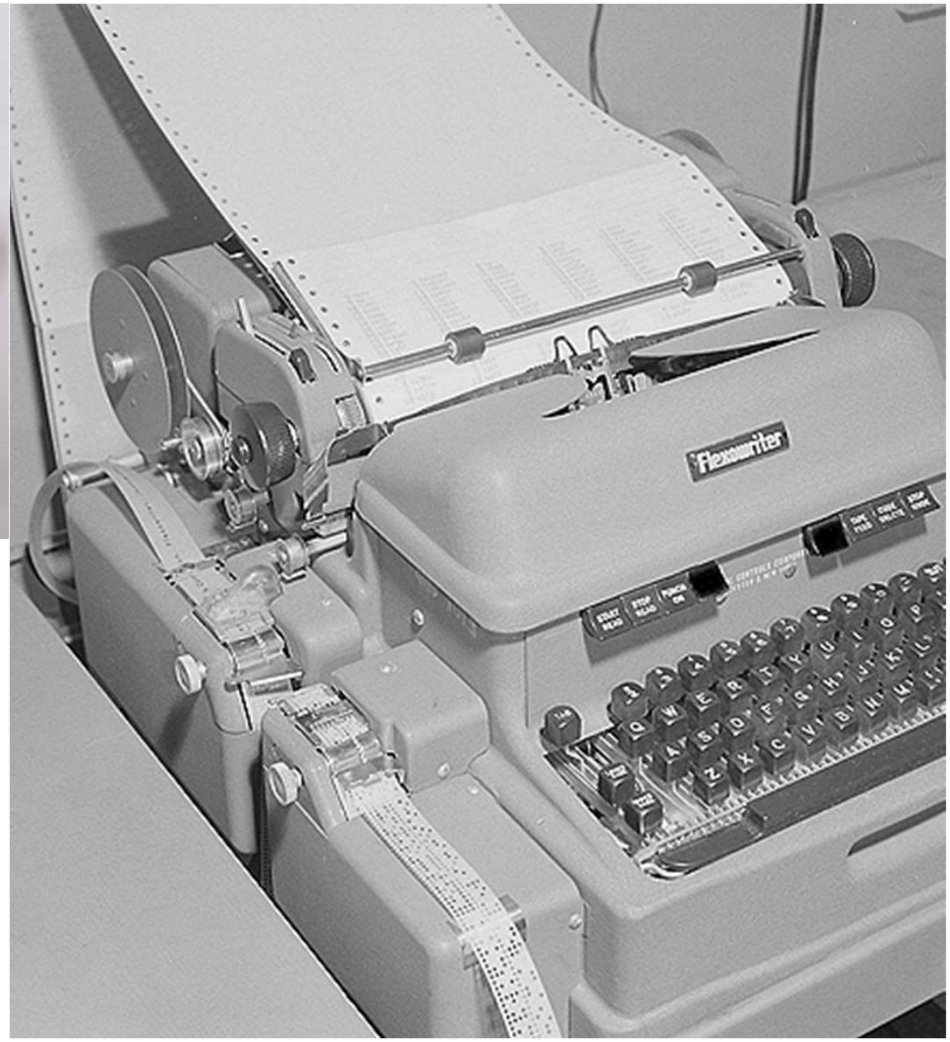
External/Removable



https://en.wikipedia.org/wiki/Punched_card

External/Removable

https://en.wikipedia.org/wiki/Punched_tape

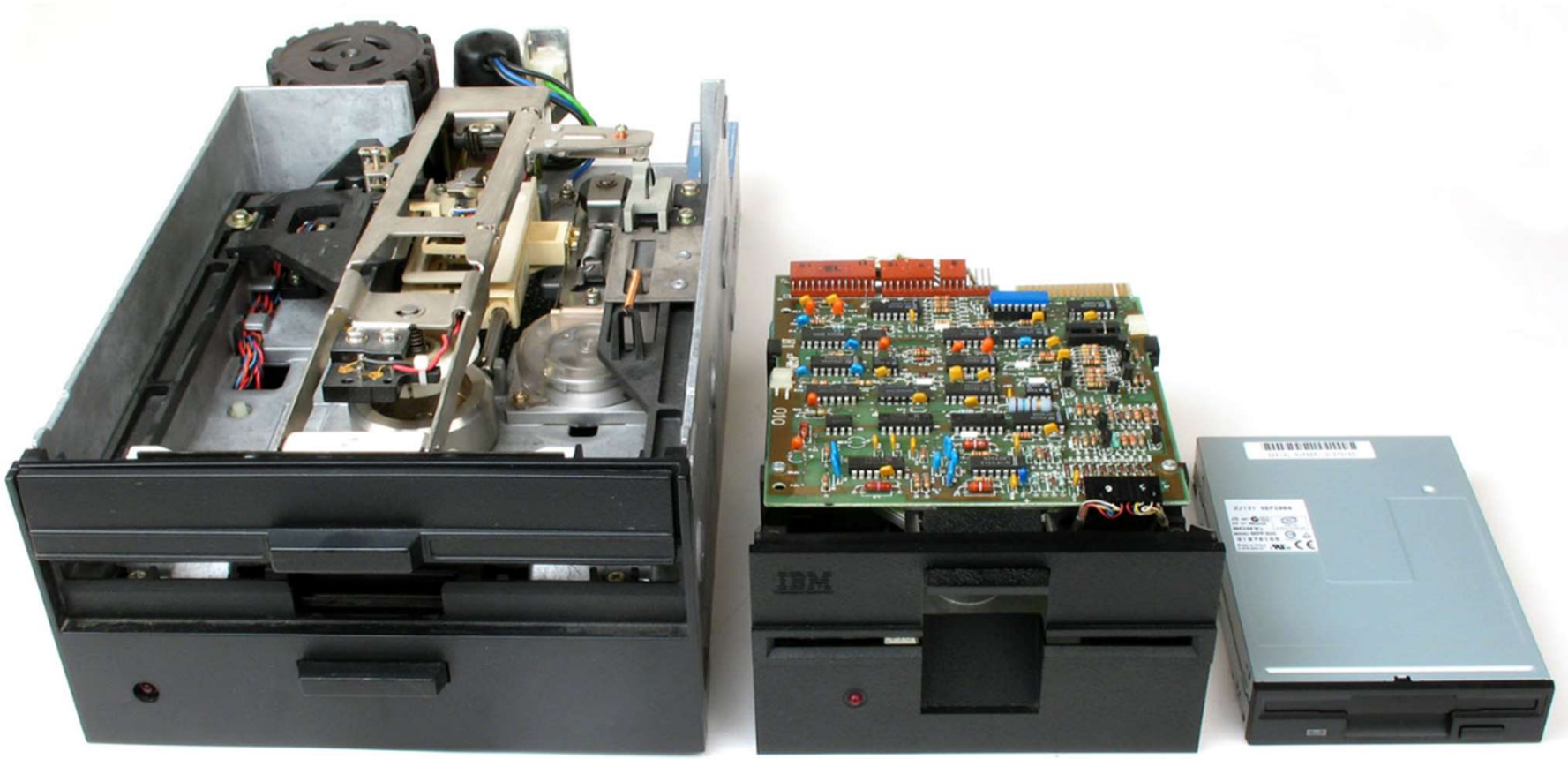


https://encyclopedia2.thefreedictionary.com/paper+tape

External/Removable

https://en.wikipedia.org/wiki/Magnetic_tape

External/Removable



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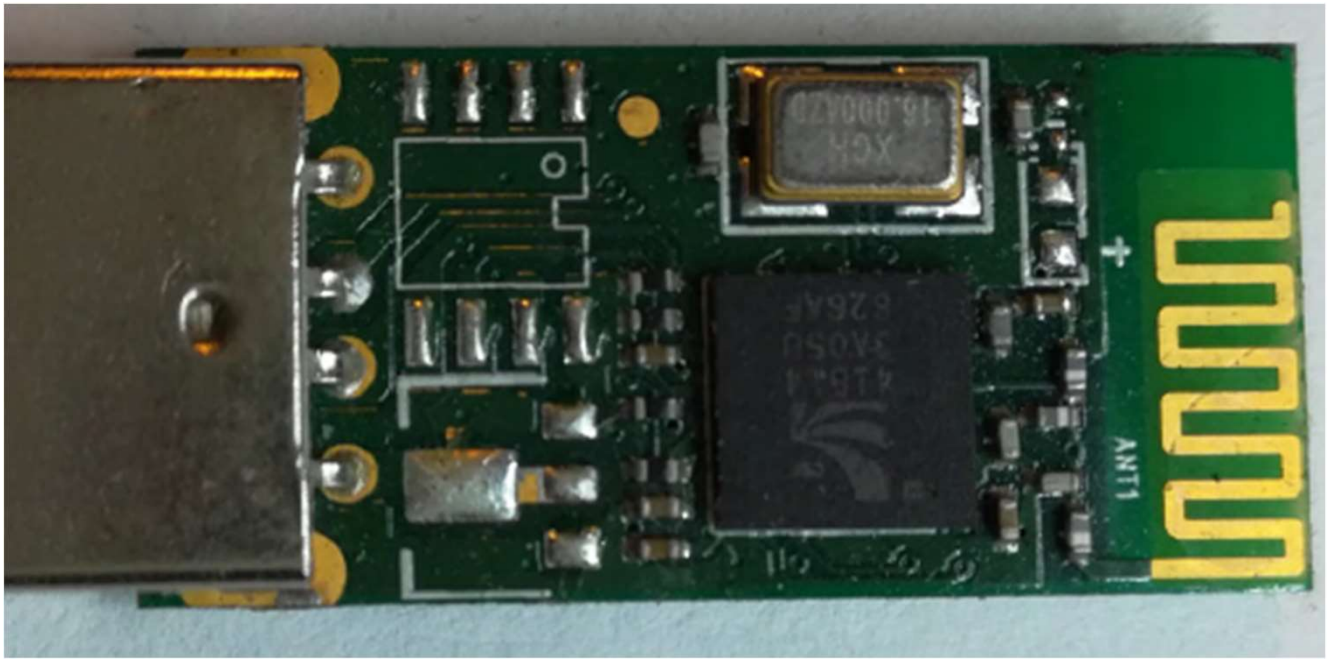
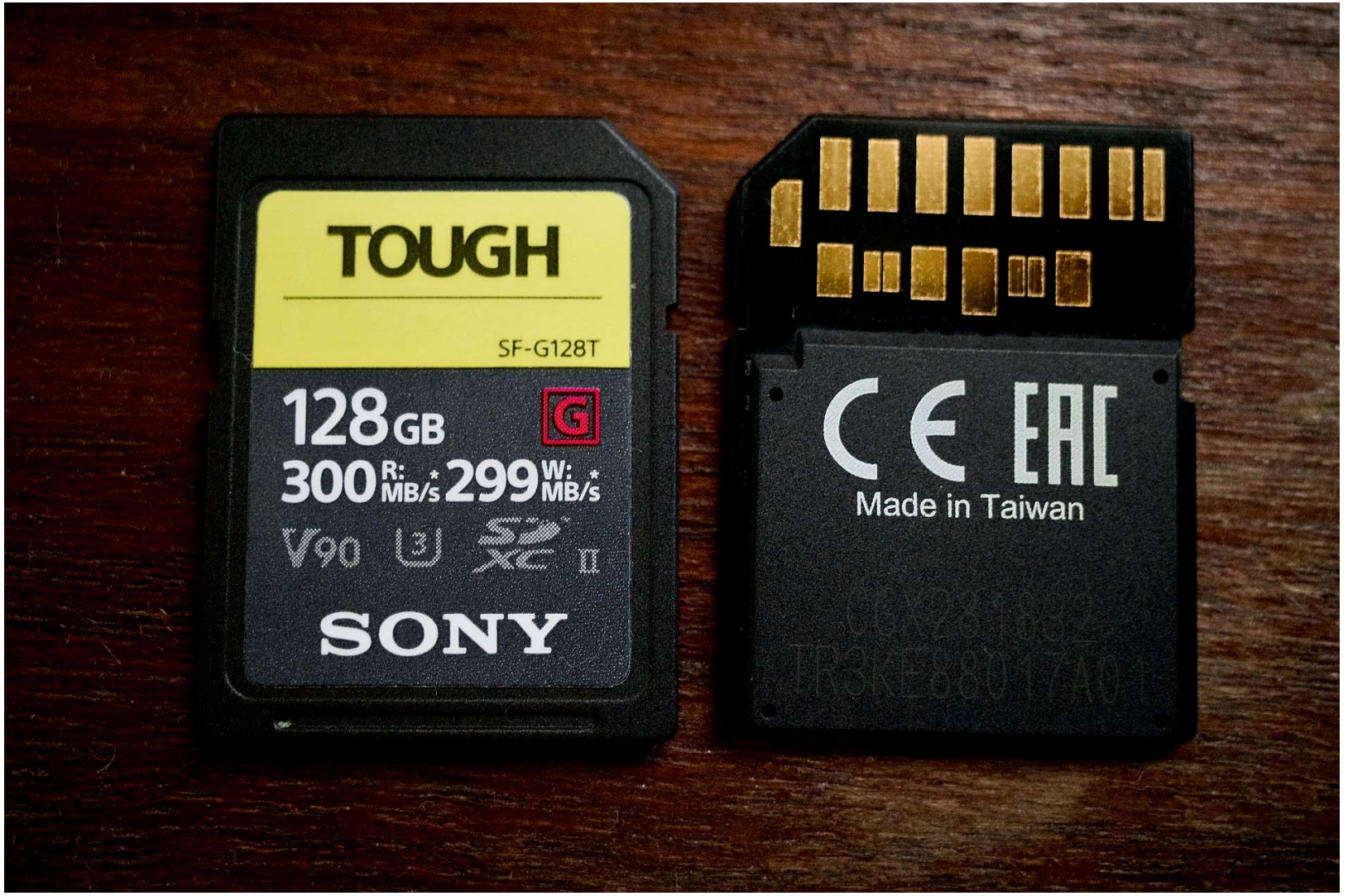


External/Removable

External/Removable



External/Removable

… and others

Remote

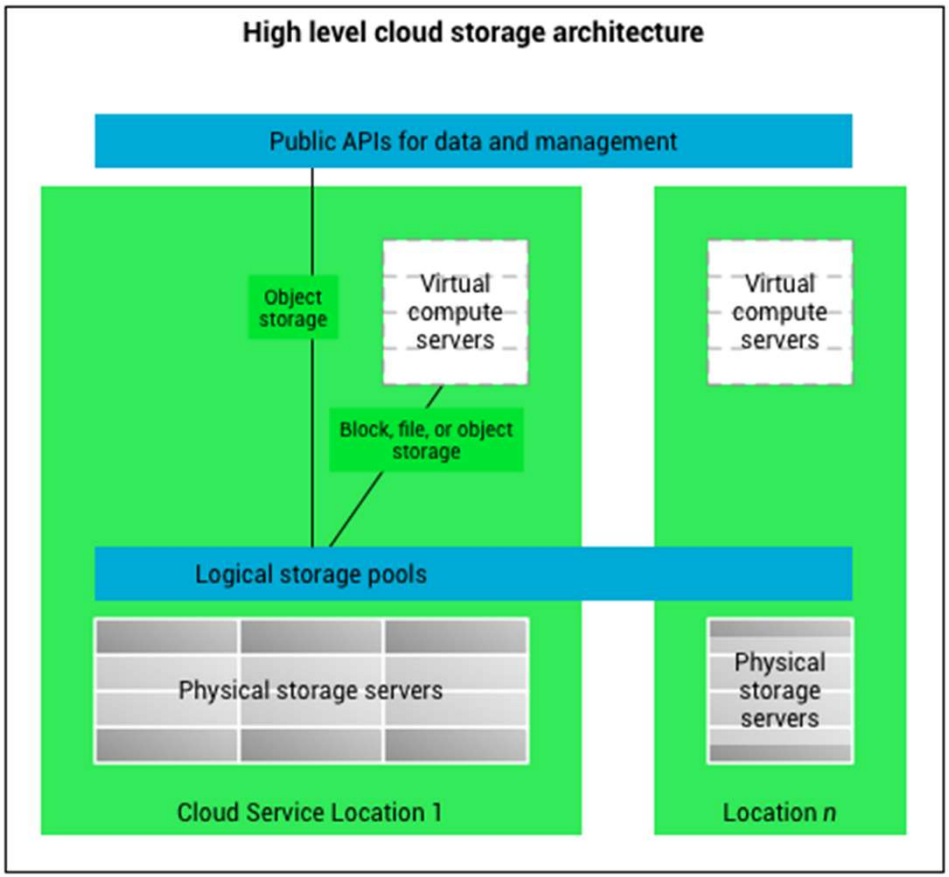
- File Srver

Remote

- NAS (Network Attached Storage)

Remote

- Cloud



Network Lines

How to deal with digital evidence

- Gathering/Seizing
- Manipulate
- Protection
- Documentation of all activities

Gathering/Seizing Digital Evidence

The goal is to seize as much as possible of all accessable digital data.

Why?

Where they are? (recap)

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Seizing order

1. Network flow
2. Volatile memory
3. Cloud storage
4. NAS
5. Integrated permanent
6. Removable

Why such order?

The degree of control over the data

- Network flow – just at the moment of flow
- Volatile memory (RAM) – up till power is on
- Cloud storage – risk of the remote tampering
- NAS – similar as cloud
- Internal disks – quite often at crime place
- Removable media – could be seized as media and gather a data later

Bit copy vs. Logical copy

- Bit copy (forensic image)
- Logical copy (forensic file copy)

What are Cons and Pros of both versions?

Limits

- Legal limits (vary based on jurisdiction)
- Size of the data
- Technical limits
- Time limits

Integrity

- Once you have a control over the seized data, integrity is one of the core conditions to take a care

- Checksums
  - MD5 (!)
  - SHA1 (!)
  - SHA256

Spec forensic SW

- Imaging SW
  - Reliability (crash could lead to error in data)
  - Error handling (what in case of reading error?)
  - Hashing (reliable integrity)
  - Maximum compatibility (various sources & formats)
  - Speed (multithread processes)

Handling & Securing

- 2 copies as minimum on different HW
  - 1st copy compressed & archived
  - 2nd copy as working
- Read-only access (?)
- Encryption(?)
- Blockchain(?)

Practice

- How to protect electronic attachement to the forensic report?