Emulation as a Tool

*What Can Emulation Do for You?*

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How to Use Emulation as a Tool?

1. Contextualization
   - Describe & preserve object environments
   - Identify, define & cope with object boundaries

2. Generalization
   - Decouple environments to run „everywhere“

3. Preservation Planning
   - Prepare environments to run “for ever”

4. Publication & Access
   - Citation of objects in context
   - Prerequisite for (peer-)review, verification, replication, re-use
EaaS - Emulation Components

- Unified access to emulation:
  - Encapsulation of different emulators and technology to common component
  - Attachment of user-media
    - dynamically (e.g. Floppy, CD-Rom)
    - permanent (e.g. HDD)
  - Interactive access to emulated environments (e.g. HTML5 viewer)
  - Technical interaction with the environment (IP, specialized protocols)
  - Main building block for complex environments
    - Client/Server etc.
  - API exposed as Web Service (WS)
    - Interoperability to other systems
bwFLA‘s Emulation-as-a-Service

- **EaaS improved emulation usability**
  - Centralize technical services
  - Hide technical complexity of emulation through unified interfaces (Web-Service API)
  - Network support
    - \( \text{NetworkEnvironment} \)
  - Browser-based access (HTML5), embeddable and shareable
- Ready-made & managed emulated platforms
  - start with a working OS!
  - no initial setup required
bwFLA‘s Emulation-as-a-Service

- **On-demand Resources**
  - EaaS components require almost no statically allocated resources
  - Allocation of computing resources „on-demand“
  - On demand cloud / cluster deployment
    - Amazon EC2 (e.g. € ~0.05 / h per user session (single node))
    - OpenStack
EaaS by Example

- Preservation of and access to inherited personal digital assets
  - citation support (HDL)
  - simple browser-based access
  - embeddable and shareable like Youtube videos

*The Digital Heritage of Vílém Flusser*

The Vílém Flusser Archive owns a personal computer the philosopher used himself. It stores mostly digital artifacts that represent Flusser’s textual work, but also a software called “Hypertext” which is dependent on the obsolete authoring system HyperCard.

**Apple Macintosh Performa 630 computer**

**Vilem Flusser Archive, Berlin**

http://hdl.handle.net/11270/2b87de90-37dc-4d66-a9e6-546a80b0b261
EaaS by Example

- Preservation of and access to inherited personal digital assets
  - authentic redaction required
  - remove „personal“ items
  - publish link to the „public version“ (still linked to the original)

Apple Macintosh Performa 630 computer
Vilem Flusser Archive, Berlin
http://hdl.handle.net/11270/2b87de90-37dc-4d66-a9e6-546a80b0b261
EaaS by Example

- Preservation of and access to (complex) e-books
  - Content protection: presentation only, object data is not accessible to viewers (also important for dig. art)
  - Access restriction: Shibboleth support

Vilem Flusser,
Die Schrift. Hat Schreiben Zukunft, 1987
Vilem Flusser Archive, Berlin
http://hdl.handle.net/11270/767f2c0b-cce6-4623-8caf-f5a890afcb75
EaaS by Example

- Preparation of custom environments
  - Centralized and effective preservation planning
  - All user images are derived from base images
  - Single migration strategy for base images required, to run on next-gen emulator, then applied to all derived images
EaaS by Example

- Access to digital objects in context
  - link object to rendering environment
  - provide access through a single HDL reference
EaaS by Example

- Tailor environment to a specific object
  - e.g. install a „viewer“
  - e.g. autostart a specific object
- Support persistent user sessions
EaaS by Example

- **Connectivity**
  - Authentic client access
    - e.g. to archived web sites (esp. MIDI sound)
  - Complex Server Setups
    - e.g. cost-effective preservation of a CMS-based Web-site (server)
    - re-enact server on-demand (click HDL)
    - access with old / current browser

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**Geocities Archive**

*One Terabyte of the Kilobyte Age*

http://hdl.handle.net/11270/21332f4a-c224-4877-abe4-ad44084716f0