bwFLA
Functional Long-Term Access

Emulation as a Service – Framework for Curation and Rendering of Complex Digital Objects

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Dirk von Suchodoletz, Klaus Rechert, University of Freiburg

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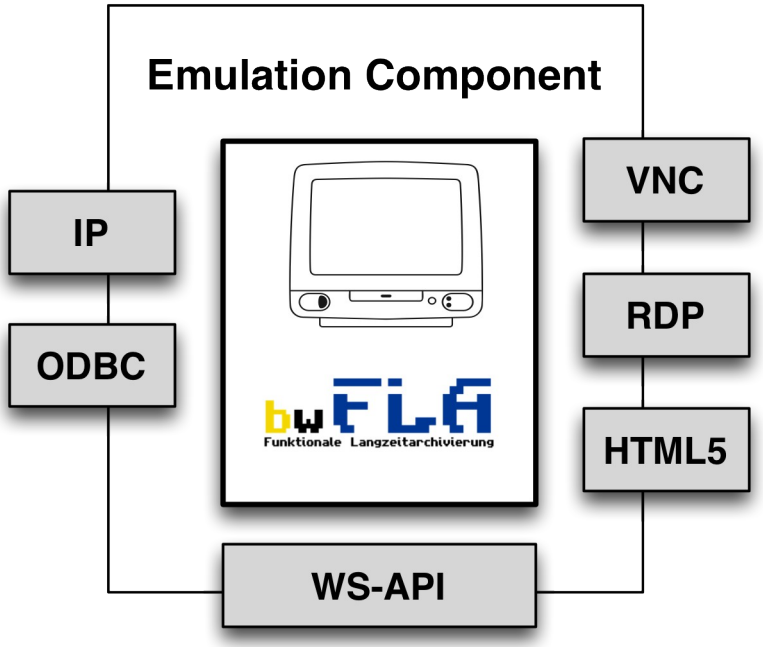
EaaS for Complex Digital Objects

- Emulation often seen as too complex for non-experts
  - Aim of EaaS: Make it availabe to a wider audience
  - Distribute and share expertise and workloads
- Make emulators available
  - In abstract service containers
  - For a broad range of use cases / applications
  - Remotely through an easy to use browser based technology

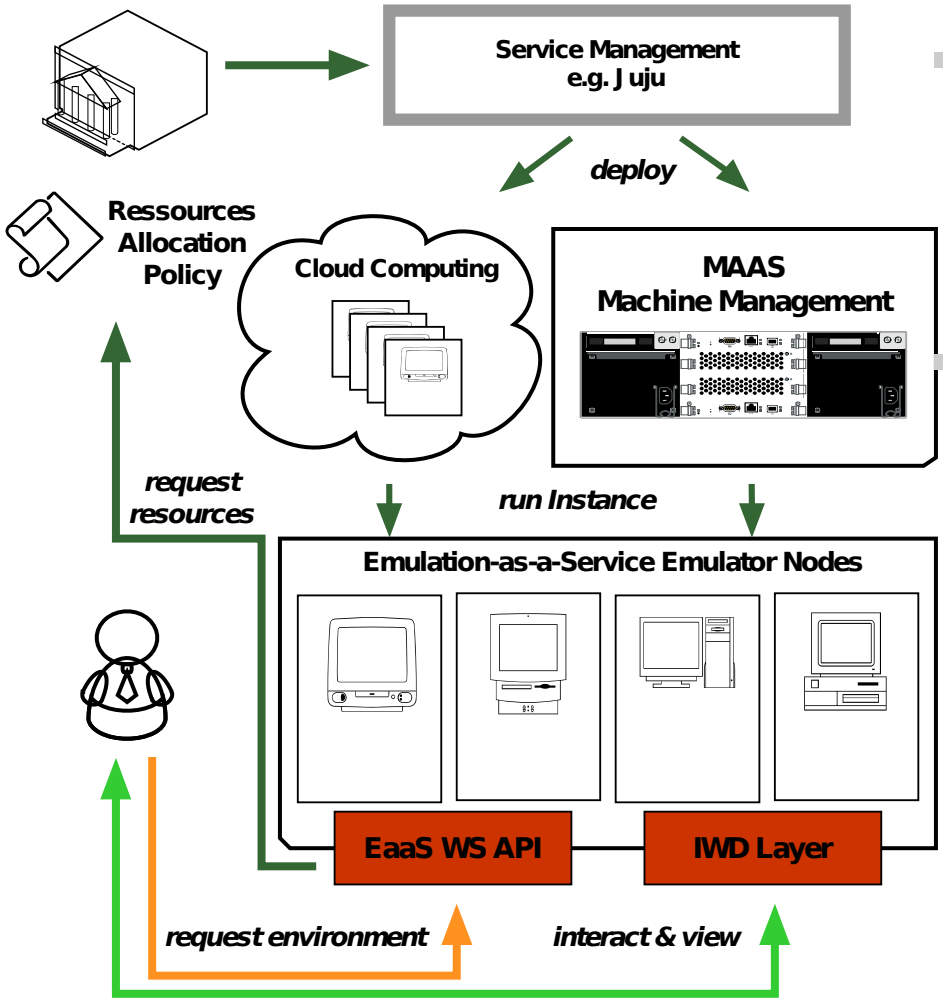
  →bwFLA framework provides such abstract services

Emulation Component

- Provides 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
    - Networked Client/Server etc.
  - API exposed as Web Service (WS)
    - Interoperability to other systems



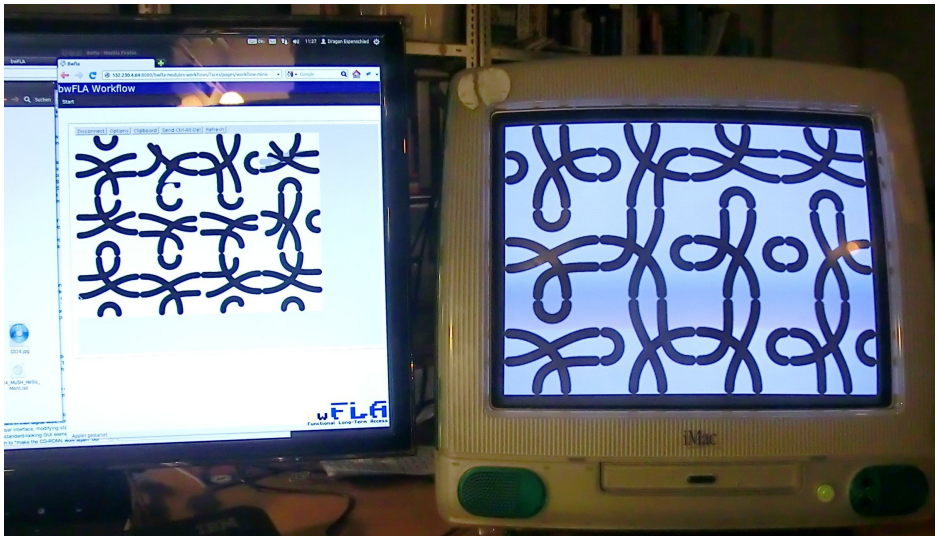
Emulation-as-a-Service



- On-demand Resources
  - EaaS components require almost no statically allocated resources
  - Allocation of computing resources „on-demand“
- Example (demo system):
  - 96 CPUs (Blade-Cluster / Demo)
  - 16 CPUs (Blade-Cluster / Testing)
  - On-demand resources via Cloud Computing
  - Currently supported
    - Amazon E2C
    - OpenStack

Example 1A: CD-ROM Art

- As a test-case, the Transmediale Archive (Berlin) kindly provided us with their collection of CD-ROM art (partly) in form of ISO or bin image files
- Most of the objects were created in between 1995 and 2005, the largest part during the height of the genre around 1999 and 2001

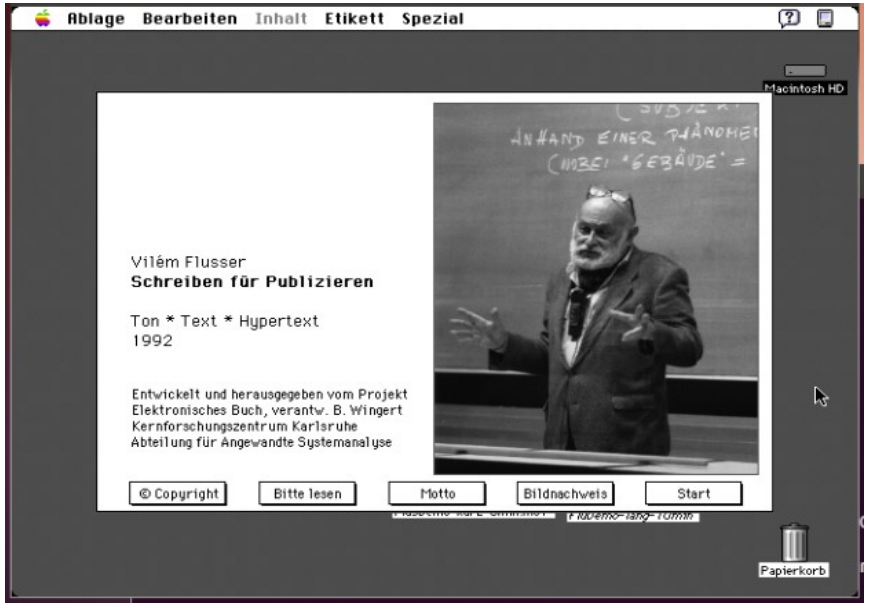


Example 1B: CD-ROM Art

- Object was once available as CD-ROM (ISO)
- In this example the object is a set of web pages and flash applications
- Object has been rendered in the MS Internet Explorer ontop of Mac OS 8.5

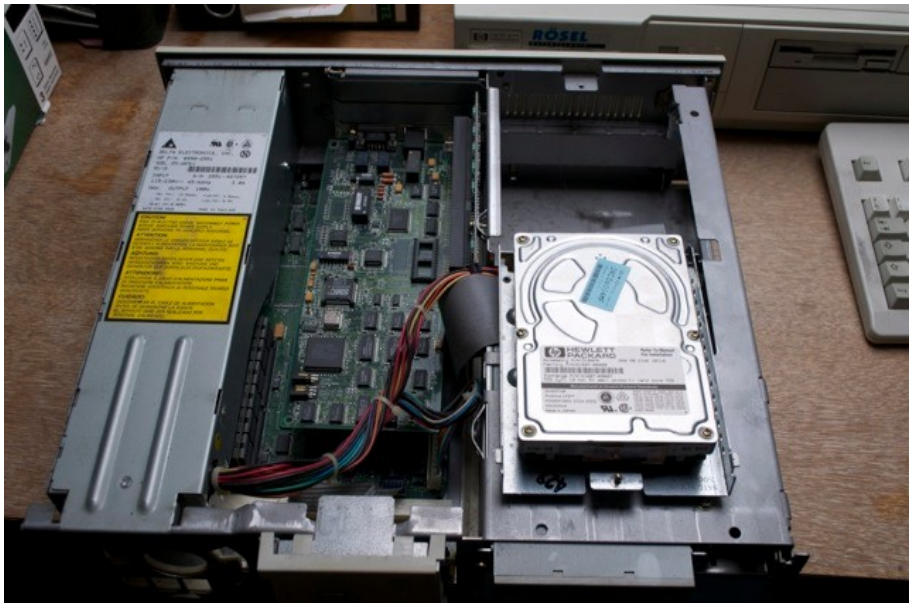
Example 2A: Philosopher's Desktop

- Complex scientific or business environments
- Systems of famous people, like writers, scientists, polititians
  - Performa MAC of Vilem Flusser
  - Original machine kept at Flusser Archive in Berlin



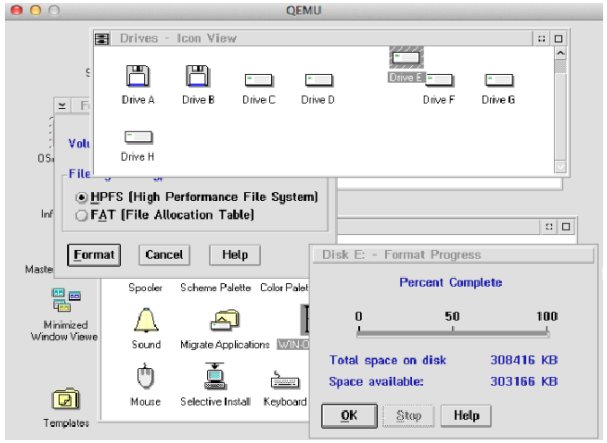
Example 2B: Scientific Database

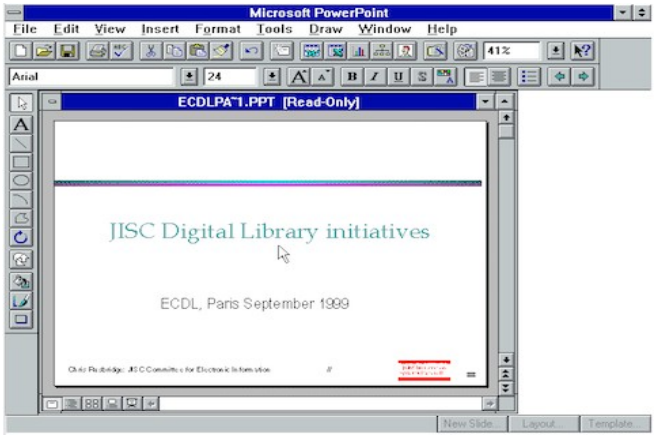
- Complex research environment from the early 1990ies for local language studies
  - Data still valuable for todays research
  - Server, 6 clients running OS/2 with DB2, networked



Example 3A: Access to Obsolete Software

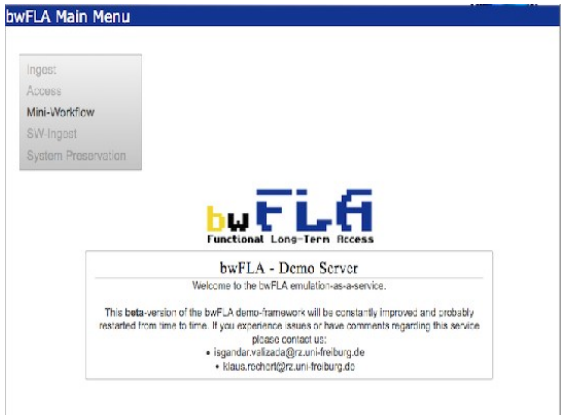
- Provide standard environments to evaluate and appraise obsolete software
  - Standard applications for obsolete formats
- Offer access to base install
  - Games, any software requiring certain environment

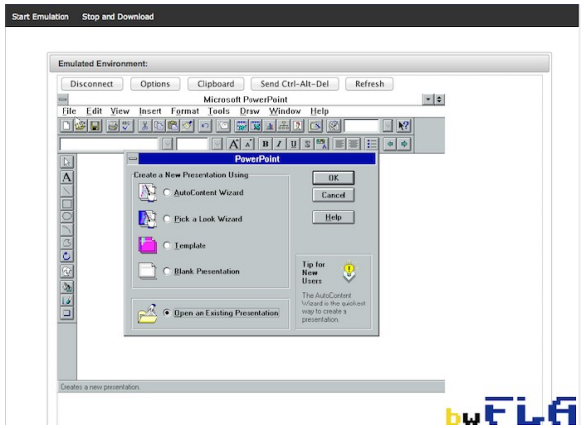


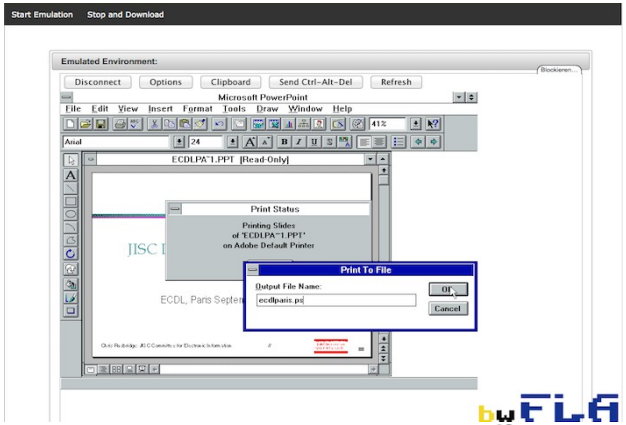


Example 3B: Migration through Emulation

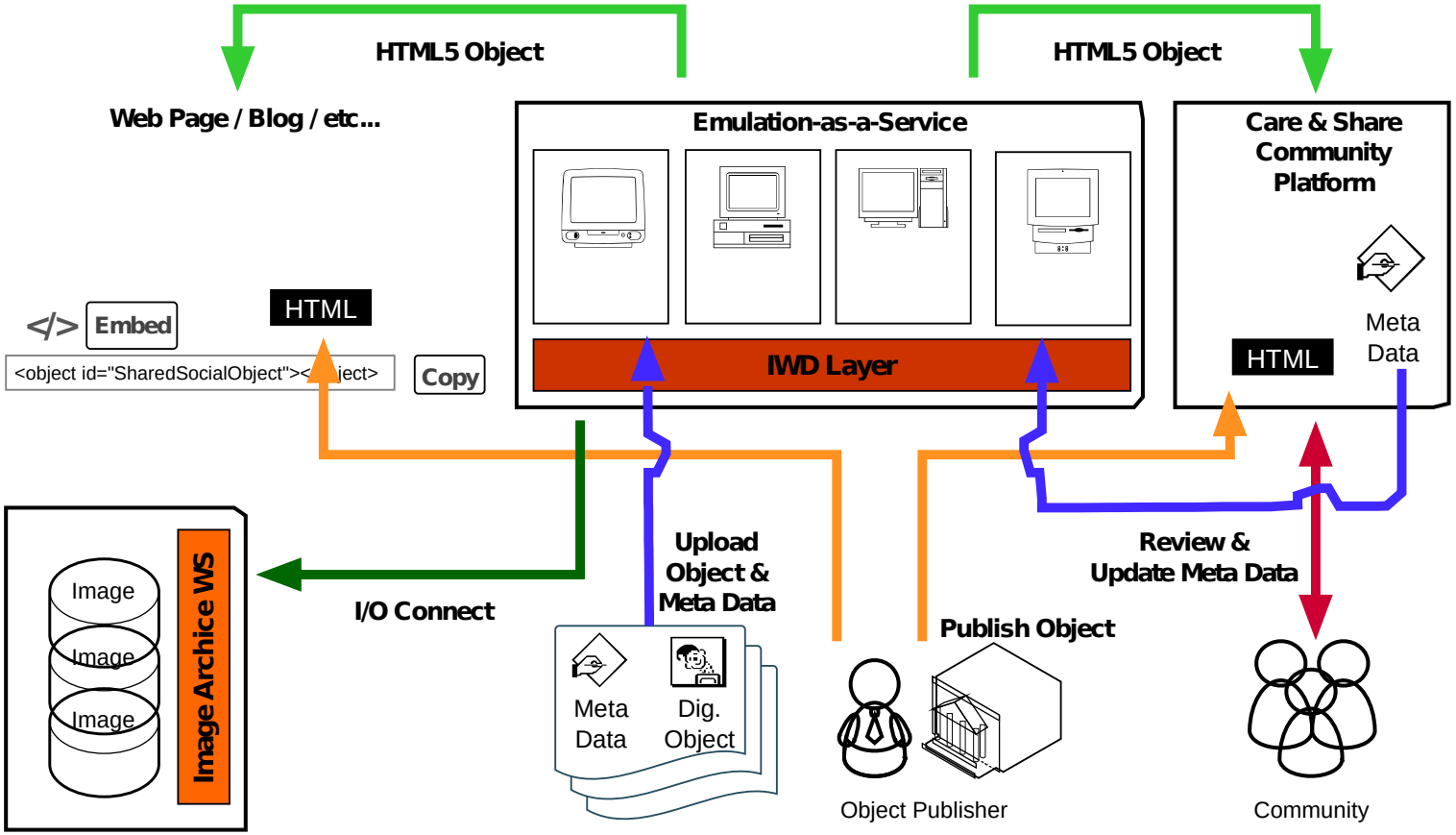
- Deploy original environments to (automatically) migrate obsolete formats into less proprietary ones
  - Normalization or on-the-fly migration upon access
  - Original applications often best to handle a format
  - Framework provide means to run repetitive tasks







Next Step: Community-driven Curation



Issues & Lessons Learned

- bwFLA's EaaS technology reduces the technical hurdles using emulation significantly, see examples online:
  - Thalamus: http://www.thomson-craighead.net/docs/thal.html
  - Triggerhappy: http://www.triggerhappy.org
- However, a networked approach also introduces challenges
- Offers the base to involve the community for evaluation and improvements
  - Users with knowledge of a certain detail in the original performance can give feedback on how well the emulator performance matches
  - Create different, alternative EaaS setups to highlight or improve a certain aspect or all of the performance of an artifact
  - Wide accessibility – Object owner remains in control

(Semi-)Public Demo

https://demo.bw-fla.uni-freiburg.de

Username: *bwfla*

Password: *demo*