Continuing to Keep Stuff Safe with Lots of Copies, Communities, and Innovation

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LOCKSS open webinar
29 January 2019
Amazon cloud crash wipes out customer data; Will users be compensated?

By Molly McHugh
Posted On April 28, 2011 10:57 am

Flickr drastically changes hosting settings for free accounts

Mikael Thalen—
2018-11-02 01:10 pm | Last updated 2018-11-02 02:20 pm

Angry Employee Deletes All of Company's Data
Published January 24, 2008
Fox News
Call it a tale of revenge gone wrong.

Yahoo Quietly Pulls The Plug On Geocities
Posted Apr 23, 2009 by Leena Rao (@leenarao)

Most Scientific Research Data From the 1990s Is Lost Forever
A new study has found that as much as 80 percent of the raw scientific data collected by researchers in the early 1990s is gone forever, mostly because no one knows where to find it.

Moon landing tapes got erased, NASA admits
Maggie Fox, Health, Science Editor
WASHINGTON (Reuters) - The original recordings of the first humans landing on the moon 40 years ago were erased and re-used,
understand + mitigate threats

• long-term **data integrity** is hard

• needs architecture informed by **actual leading threats to data**

• don’t underestimate:
  • people making **mistakes**
  • **attacks** on information
  • organizational **failure**
what is LOCKSS?

- a widely-accepted **principle** for the persistence of digital info
- a digital library-focused **program** of **Stanford Libraries**
- a research-informed **software** app for p2p digital preservation
- an international **community** of institutions + networks
more than lots of copies

- lots of copies is **necessary but not sufficient**
- central points of failure **can undermine all copies at once**
- LOCKSS provides:
  - continual **integrity checking + repair**
  - b/t mutually-distrusting, **independent peers**
  - on a network that **your community controls**

"Domino's" by david pacey under CC BY 2.0
routine audit + repair

- ensuring **long-term data integrity**
  - must **read data** to know it’s good
  - easier to **repair data sooner**
- network nodes **conduct polls** to validate integrity of distributed copies
- more nodes = **more security**
  - more nodes can be **down**
  - more copies can be **corrupted**
  - …and polls will **still conclude**
community + digital preservation

• communities **complement** LOCKSS:
  • **resilience** against organizational failure
  • native **heterogeneity**

• preservation is an **active** community effort

• lots of **communities** keep stuff safe

“Redwood Canopy” by Floyd Stewart under CC BY-NC-SA 2.0
How LOCKSS Works
distributed digital preservation

• align w/ **best practice**
• achieve **resilience** not possible w/ centralized solution

• for use either:
  • as **dedicated** preservation solution
  • to **supplement** local preservation (e.g., for most important materials)

• particular to LOCKSS among service providers:
  • strongly **research-based**
  • articulated **threat model**
  • supports **local custody**

“Stone stacks” by Jack Malvern under CC BY-NC 2.0
content lifecycle

• **ingest content**
  • web harvest, OAI-PMH, direct interconnect, or drag-and-drop via LOCKSS-O-Matic

• **manage content**
  • web-accessible GUI to monitor preservation activity (+ select new content for archiving, in some networks)

• **preserve content**
  • each node retrieves content independently
  • once stored, audit + repair takes place automatically, on ongoing basis

• **deliver content**
  • proxy server, web server, OpenURL
setup, support, costs

• organize your community around content of shared concern
• we will consult on fit, technical requirements, workflow integration
• pilot implementation w/ subset of nodes to validate workflows
• production implementation
• ongoing support
• participants are asked to join the LOCKSS Alliance (annual membership fee)
start new or join existing network

- **start a new network**
  - recommend 4+ copies
  - we can host node(s)
- also an option to join an **existing network**
  - reach out to network communities directly
- we are exploring how to **better support needs of individual orgs** that aren’t aligned w/ a logical community
Use Cases

"ROC/Bredero" by Jesper2cv under CC BY-NC-ND 2.0
post-cancellation access for e-resources

• networks:
  • Global LOCKSS Network

• restore best features of print journal holdings lost w/ online publishing transition:
  • local custody (vice contingent access)
  • lots of decentralized copies (vice fewer, centralized copies)

• to better assure:
  • preservation of scholarly record
  • continuing library role as steward
dark archive for scholarly publications

- networks:
  - CLOCKSS Archive
  - Public Knowledge Project Preservation Network
- CLOCKSS
  - co-governed by libraries + publishers
  - content triggered OA when no longer available
  - top CRL TRAC audit score
- PKP PN
  - OA content hosted on OJS
  - free + seamless to use for folks publishing on OJS
government information

• networks:
  • Canadian Government Information
  • Digital Federal Depository Library Program
• can’t necessarily depend on government for permanent access
• save + re-decentralize government information
in institutional repository content

• networks:
  • [Alabama Digital Preservation Network](https://www.aldigitalpreservation.org)
  • [MetaArchive Cooperative](https://www.metaarchive.org)
  • [WestVault](https://wes-vault.org)
• all types of content
• service models:
  • all depositors also host infrastructure
  • subset of orgs hosts infrastructure but serves whole community
• governance + infrastructure both community-based
web archives

• networks:
  • Ivy Plus Libraries Confederation Preservation Network

• growing relative importance of web archives for collection development

• decentralized local custody + preservation to complement Archive-It
national / nationally-licensed scholarly publications

- networks:
  - Cariniana
  - German national network

- natural national interest in preserving own OA output

- national consortia want jurisdictional control over licensed scholarly content
Software Re-Architecture
software re-architecture motivation

- **monolithic** Java application
- only deployable as **end-to-end solution**
- lacking **modern APIs**
- maintaining functionality on our own that others increasingly address as a community
- undertook re-architecture 2017-2019 w/ [Mellon Foundation funding](http://mellonfoundation.org)

"The SF Bay Bridge reopens" by Benjy Feen under CC BY-NC-SA 2.0
software re-architecture goals

- capitalize on **work of broader communities**
- de-silo + enable **external integrations**
- empower community of practice w/ **better documentation** + **well-defined APIs**
- evolve w/ web + **digital preservation ecosystem**
anticipated outcomes

• collaborate to **build new hybrid solutions**
• align better w/ **community workflows + interfaces**
• **simplify adaptation** of LOCKSS to local needs
• support LOCKSS technical **community of practice**
• **expand contexts** where LOCKSS can contribute to digital preservation
new integration possibilities

• **Data Life-Cycle Management (DLCM)**
  • Swiss universities collaborative research data management

• **Software Preservation Network (SPN)**
  • promoting best practices + piloting distributed emulation infrastructure

• **Webrecorder**
  • high-fidelity web capture + replay software
fixity service

- some content too big for lots of copies
- instead, make lots of copies of checksums
- subject to LOCKSS polling + repair
- provide API endpoint
- compare w/ hash result generated by external system

“Measure twice, cut once...” by GretaMichelle Joachim under CC BY 2.0
cloud friendlier

- may enable some use cases; improve handling of others
- technically feasible, but not economically optimized
- explore using cloud in concert w/ fixity service
- benchmark cloud costs (revisiting prior research on LOCKSS in the cloud)
- leverage w/o ceding value of distributed, local content custody
Wrap Up

“Birmingham City Centre - Nov 2013 - The New Library Wrapped and Ready for Christmas” by Gareth Williams under CC BY 2.0
takeaways

- LOCKSS is a **general-purpose** digital preservation platform
- re-architecture will provide **improved integration** + **interoperability**
- learn more at our **new website**: [lockss.org](http://lockss.org)
- **please contact us** with any questions, or ideas on how we can work together
Questions