TOLERATING BUSINESS FAILURES IN HOSTED APPLICATIONS

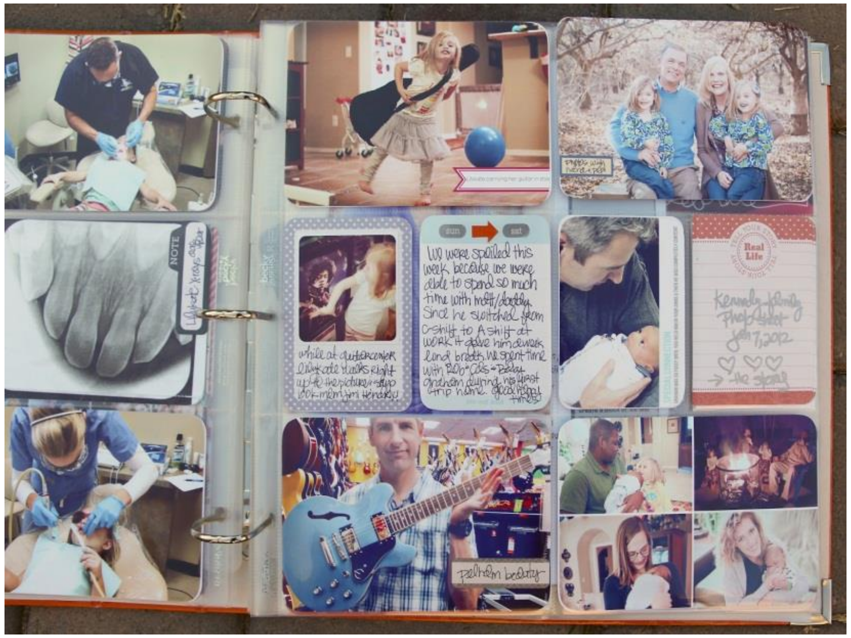
Jean-Sébastien Légaré

Dutch T. Meyer, Mark Spear, Alexandru Totolici, Sara Bainbridge, Kalan MacRow, Robert Sumi, Quinlan Jung, Dennis Tjandra, David Williams-King, William Aiello, Andrew Warfield

NSS Lab. UBC

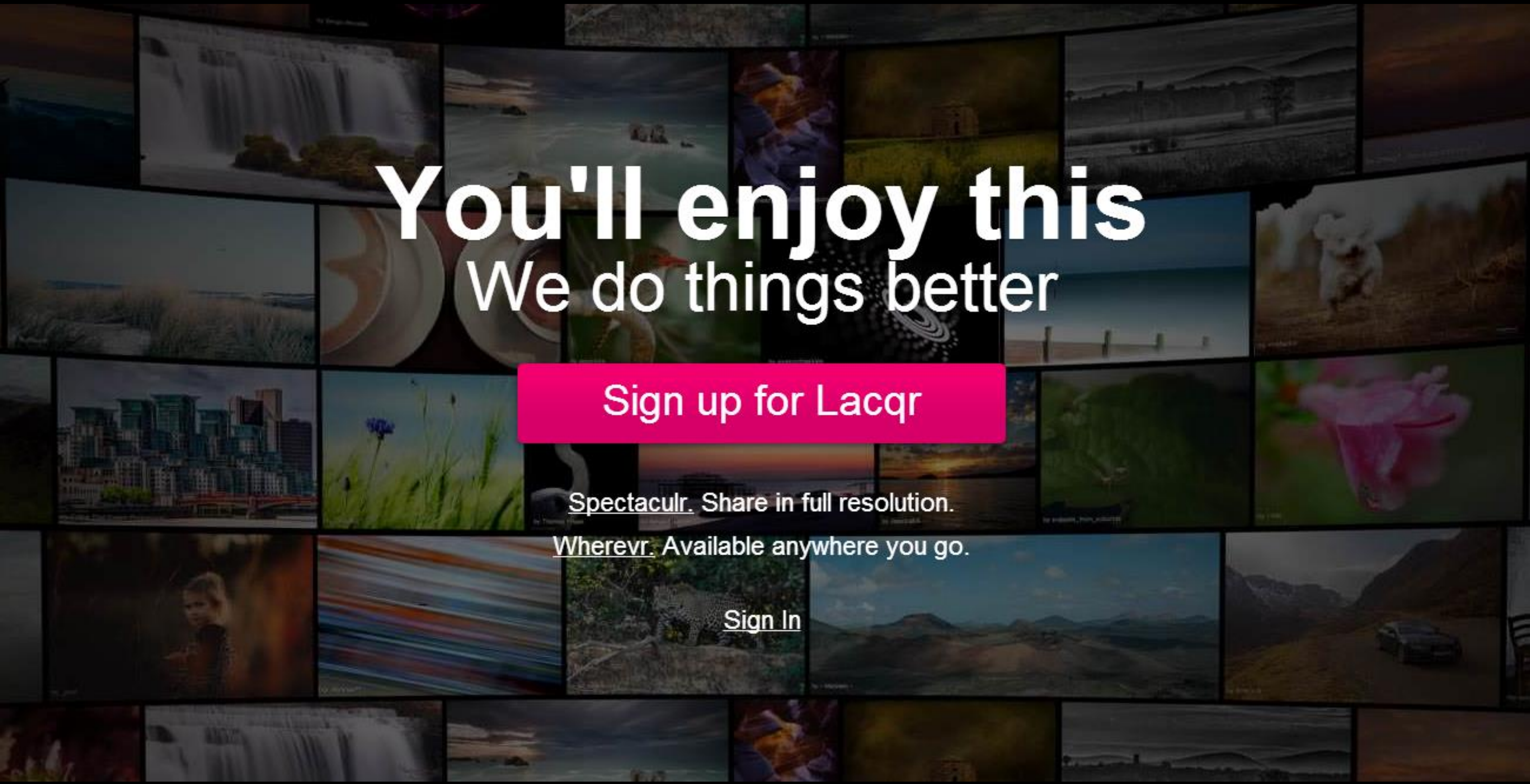
SoCC 2013

PHOTO ALBUM



We were spoiled this week because we were able to spend so much time with matt/daddy. Since he switched from C-shift to A shift at work it gave him a week long break. We spent time with Bob, Cis + Bebe + Graham during his first trip home. Good times!

while at guitar center lilly kate walks right up to the picture + says look mom jimi hendrix!



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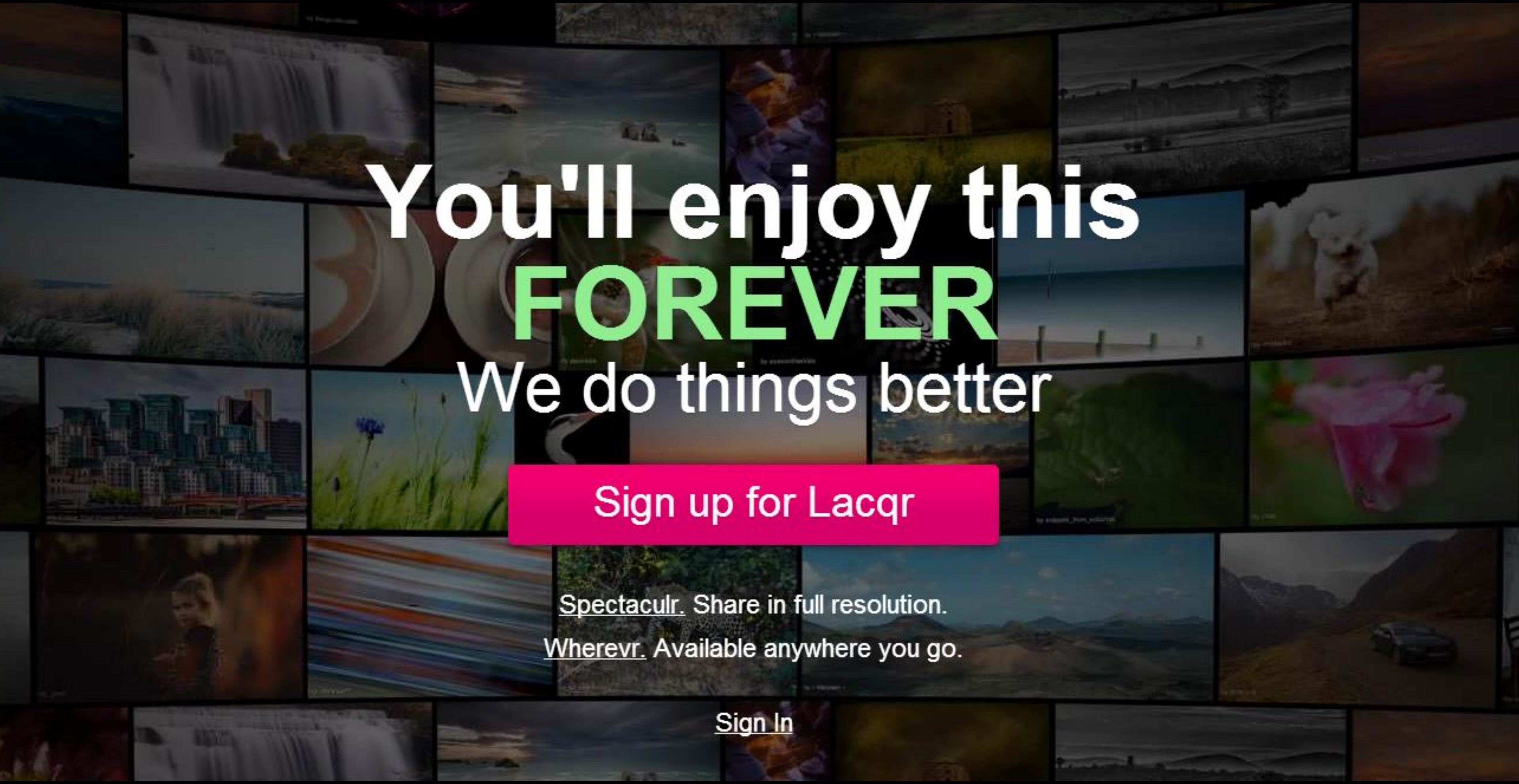
APPS ARE GREAT. BUT THEY FAIL.

- GeoCities
- Piknik
- Google Reader
- Friendster
- And more!

EXPORT IS NOT ENOUGH

all_my_data_in_xml.tgz



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FOREVER

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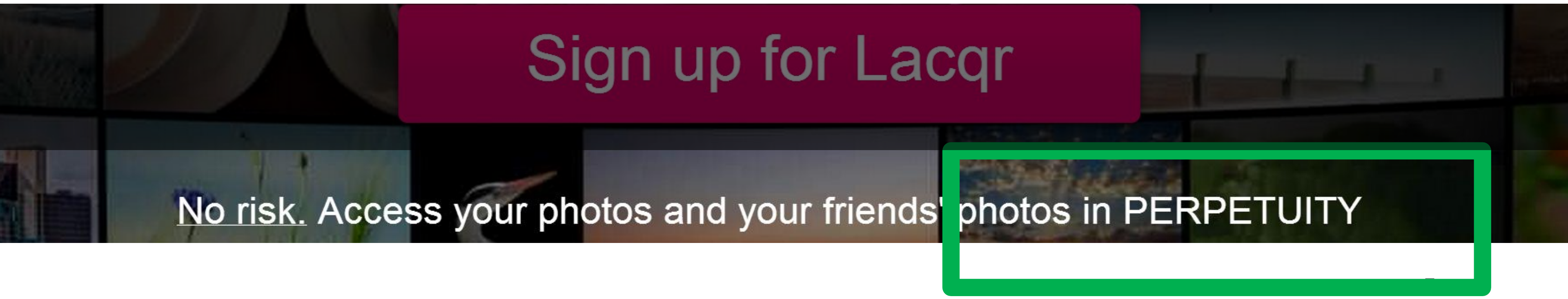
Sign In

CONTRIBUTIONS

The Micasa platform that allows developers:

- To build apps that tolerate EOL

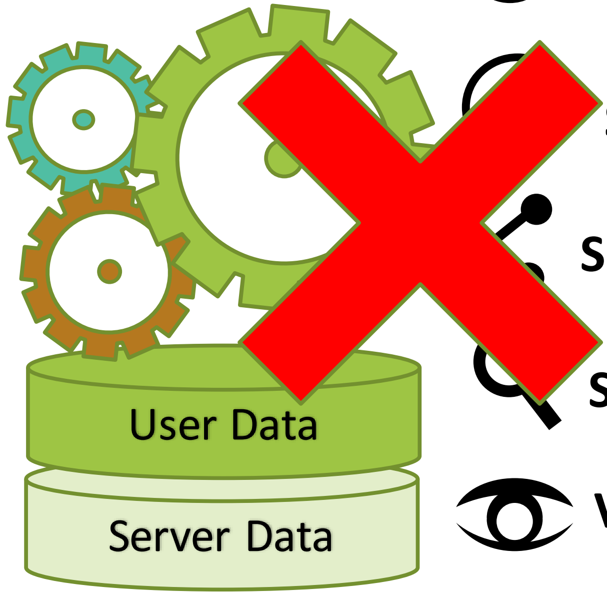


No risk. Access your photos and your friends' photos in PERPETUITY

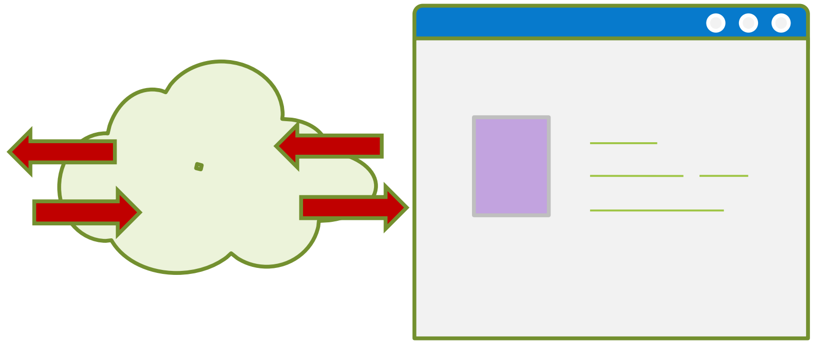
- To assert auditable guarantees about EOL behavior

HOSTED APPS ARE GREAT.

BUT… FAILURES ARE CATASTROPHIC



- ROLLING UPGRADES
- SPEED
- SHARING/AC
- SEARCH
- VALIDATION



WE CAN BUILD DIFFERENTLY

- **Cloud storage is available to *users* (Move data)**
- Browsers are more powerful (Cache logic)

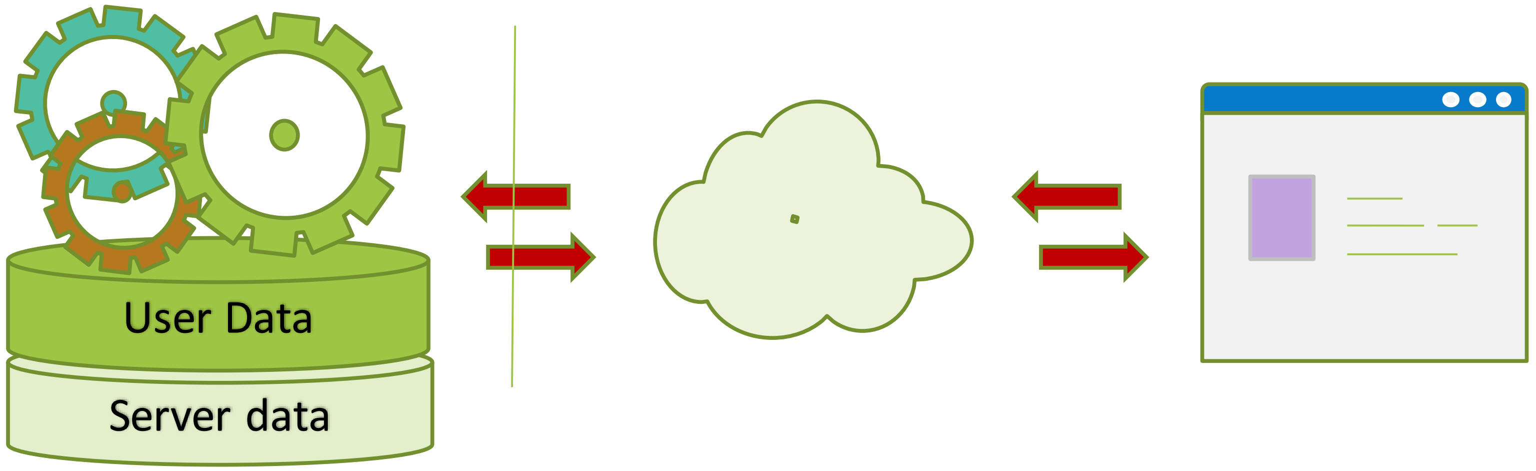
ROLLING UPGRADES

SEARCH

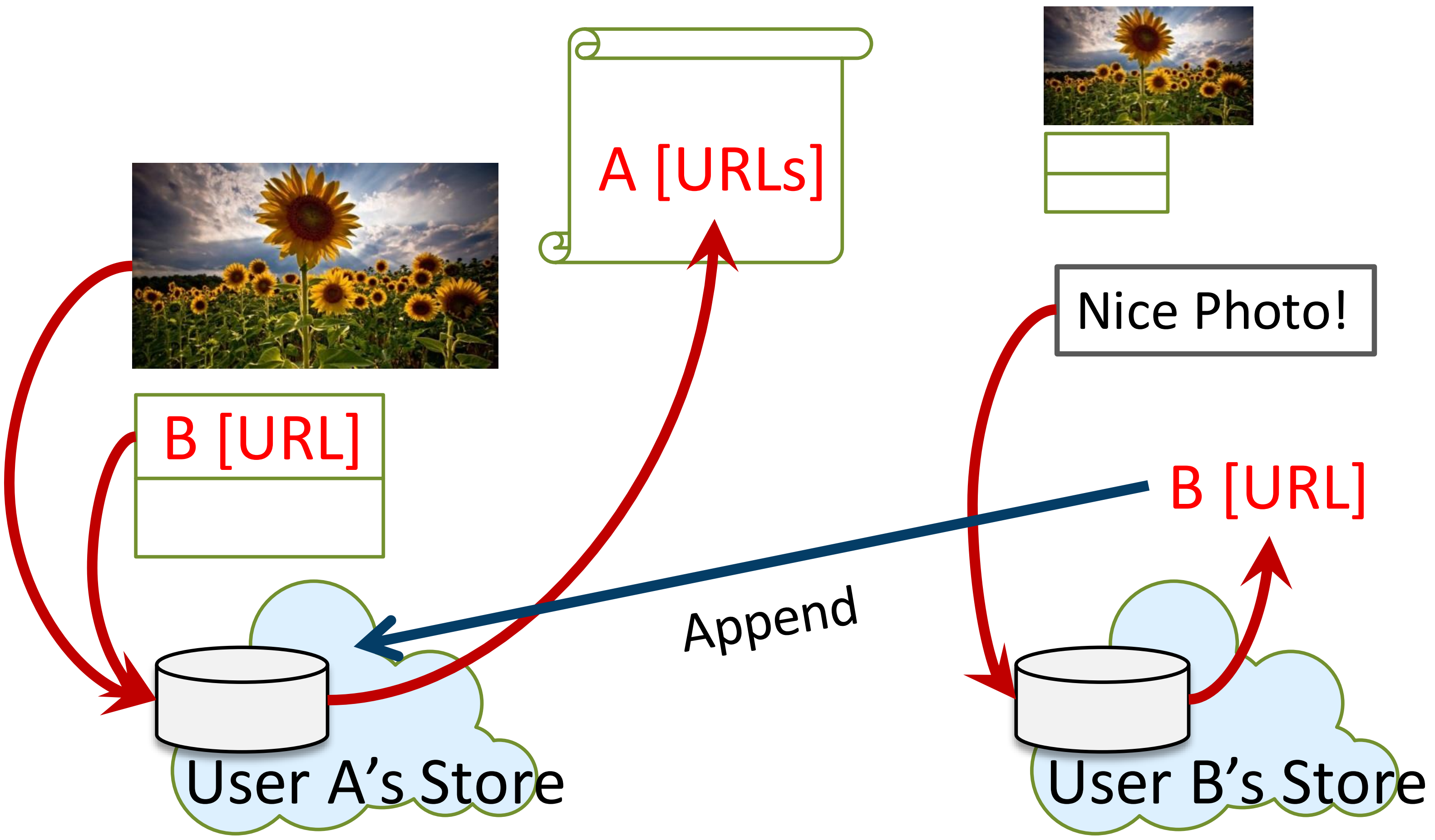
SHARING/AC

SPEED

VALIDATION



SHARING AND ACCESS CTL



DATA STORE DESIGN GOALS

- Allow multiple-SP ecosystem. All support API.
- Sharing: capability URLs to objects
  - No registr. to friend store.
  - Files and folders
- Revocation: undo share
- Limit writes: No RW to other stores. Append only.
  - Inbox-style communication
- Migrate between storage providers

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ROLLING UPGRADES

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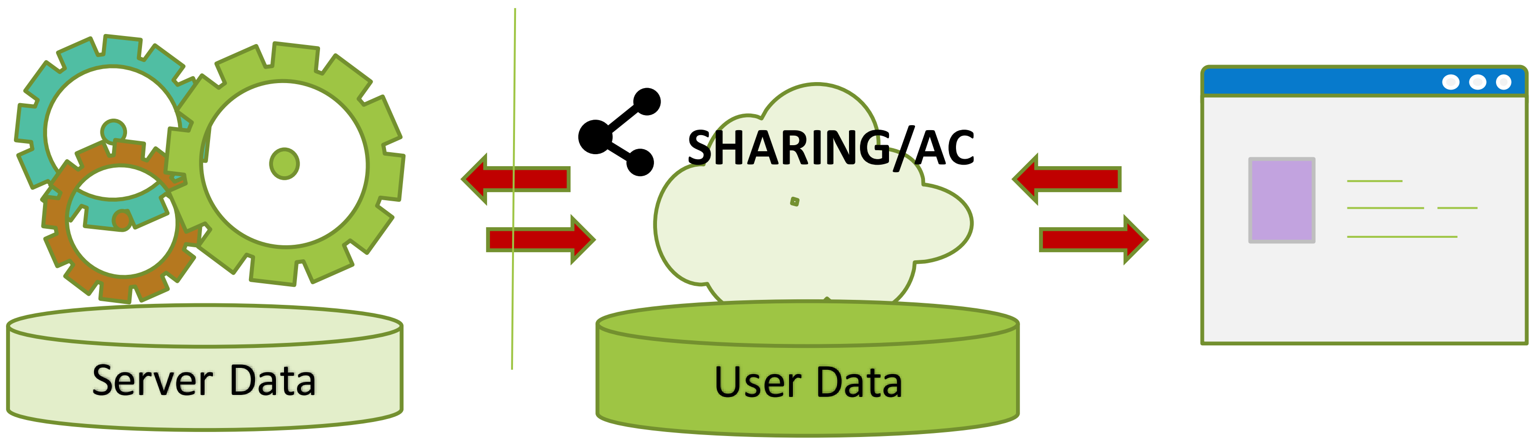
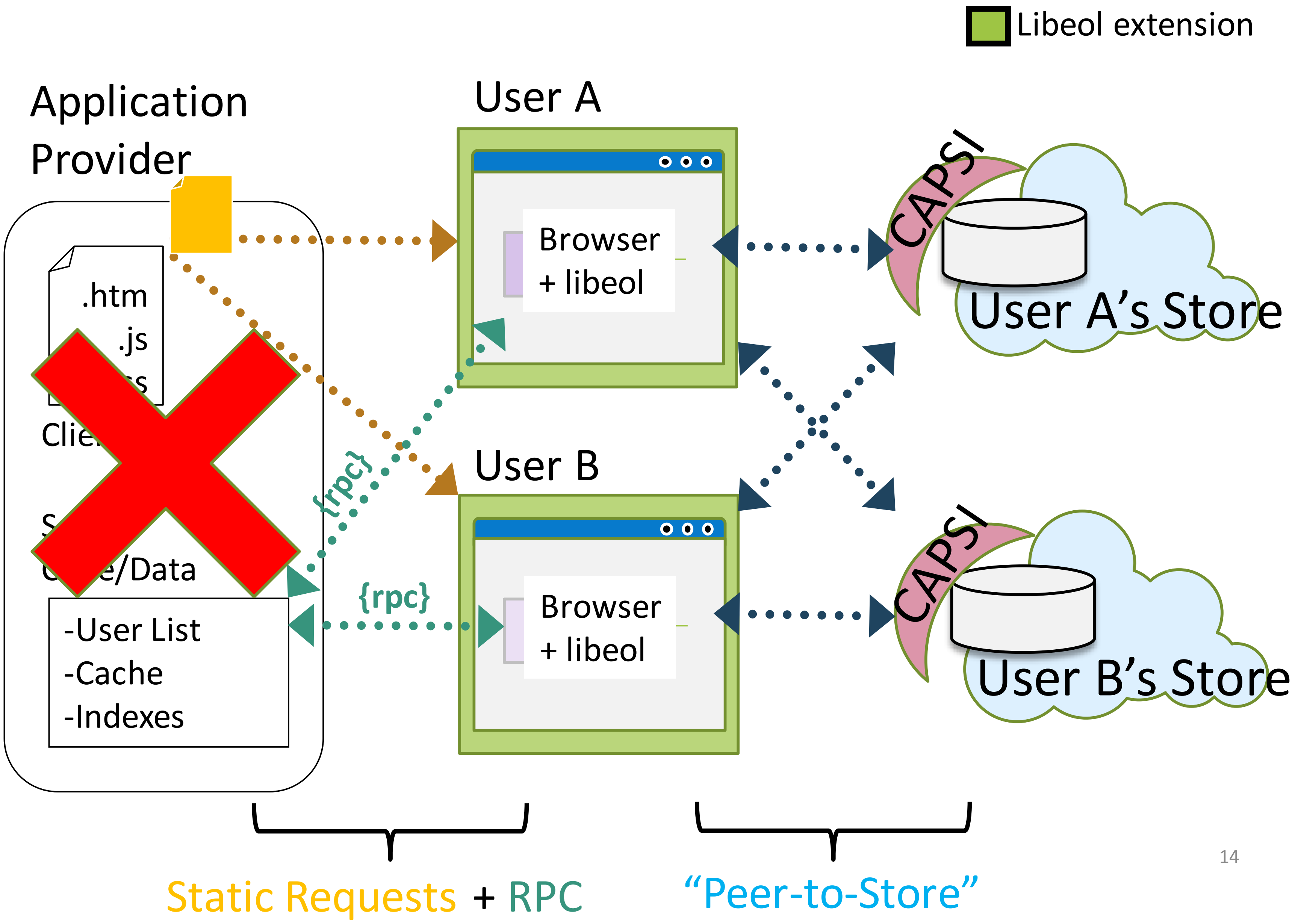


CLIENT SIDE DESIGN GOALS

- Code cached using HTML5 Application Cache
- Durable storage of client side code--can use storage provider
  - After (manual or automatic) trigger that server is gone, need to switch to "unplugged" code paths
- Library support/extension for redirecting app.com requests when unplugged


🟩 Libeol extension
Application Provider
.htm
.js
Clie
S
e/Data
-User List
-Cache
-Indexes
{rpc}
{rpc}
User A
Browser + libeol
User B
Browser + libeol
CAPSI
User A's Store
CAPSI
User B's Store
Static Requests + RPC
"Peer-to-Store"

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SEARCH

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ROLLING UPGRADES

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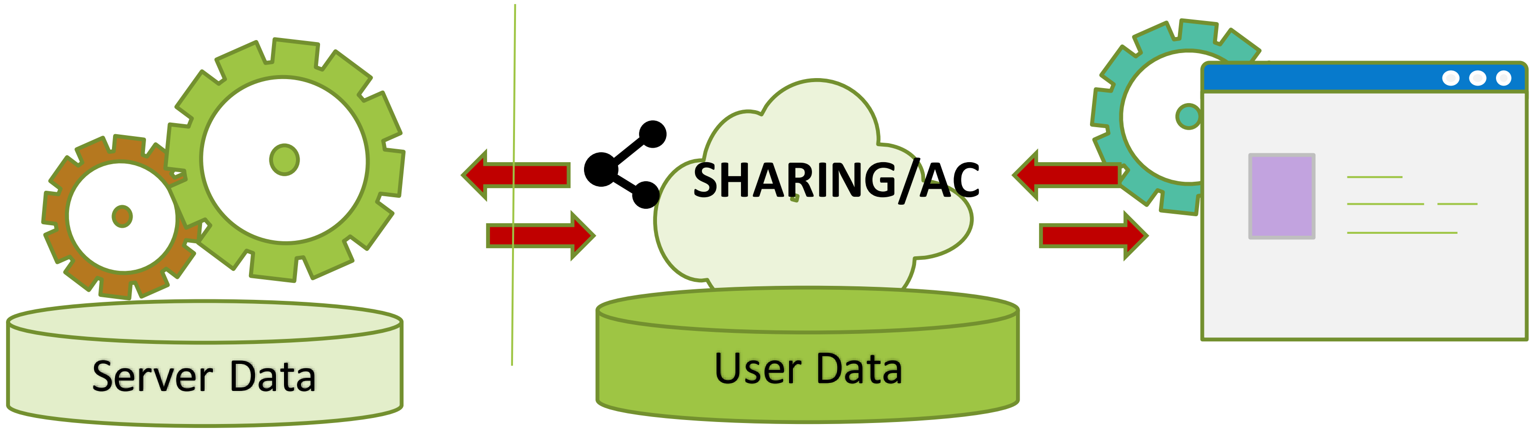

VALIDATION

- Users have RW/Del over their store
- Extra precautions when displaying user data
    - content integrity filters (object len, checksums)
    - routines to digitally sign and verify messages

CONTRIBUTIONS

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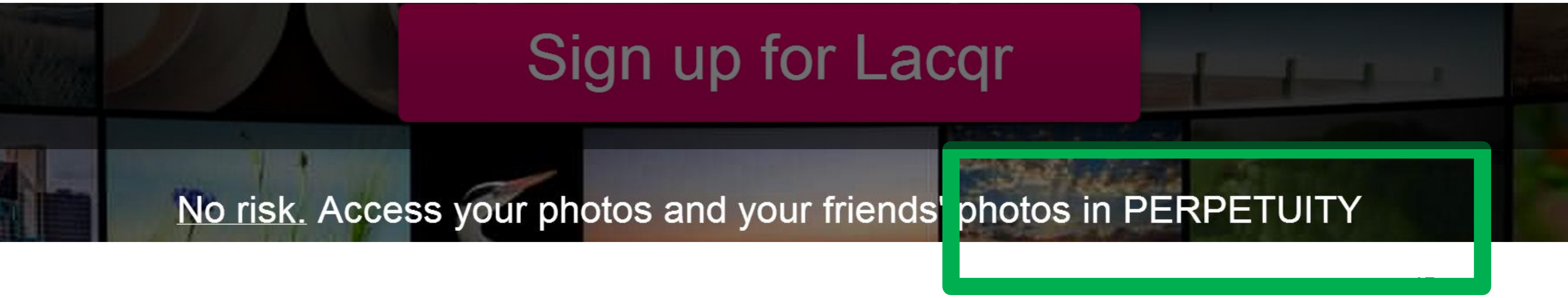

No risk. Access your photos and your friends' photos in PERPETUITY

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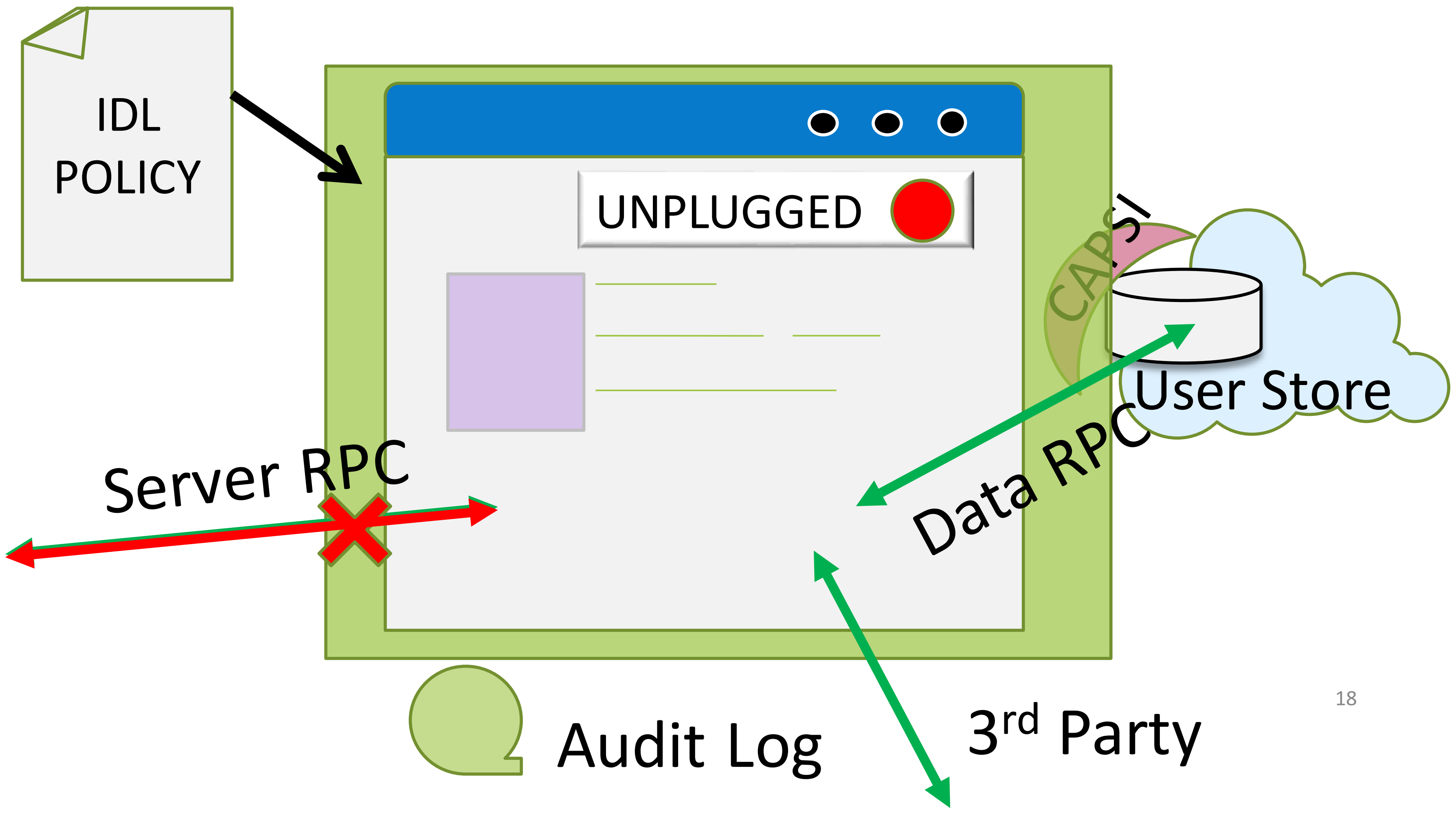
AUDITABLE PROVIDER GUARANTEES

🟩 Monitor



EVALUATION

- Ease of development
- Satisfactory performance
- Good user experience

APPLICATIONS BUILT

App Name	SLOC	Description
TwoCans	1500	IM System
HotCRP-P	10K	Permanent HotCRP
Lenscapes	2200	Photo album sharing
Data Viewer	650	Namespace file explorer

Python Server prototype implementing CAPSI API (X lines of code).
Supports three underlying storage backends, FS, Azure, S3.

TWOCANS

- Chat owner keeps list of message capabilities
- Message authors can revoke their messages
- Uses client-side crypto to sign and verify messages
- Very simple hosted service
  - Messages don’t go through server: p2store
  - Only user registry and public chat URLs

HOTCRP-P (PERMANENT)

- Refitted php app to DHTML view logic
- Client-side archiving of papers/reviews (copy)
- Local index is built using applet port of Apache Lucene
- Unplugged mode allows local archive search (regardless of conference website availability)

PERFORMANCE

- Application benchmark for caching, sampling Flickr pages.
- Compare loading pages statically with content-identical Micasa impl.
- Evaluation server keeps flattened capability structure.
- Compare cached vs non-cached load times and BW.

Birdi@:
Nice!

Chex:
great comp.

Accessing an item: $root/Comments/0/{icon, author, text}

OVERHEADS

- Fetching Micasa blobs slower than apache static fetch
- Content integrity overhead (checksum + signatures)
- Additional data dependencies

LOAD TIMES AND BW OVER STATIC

- Page Load times:
  - 80% of pages have <100% overhead over static (2sec vs 1sec avg)
  - With caching, all pages have <40% load times overhead
- BW Consumption
  - 23% overhead, 6% when cached hierarchies are available

FUTURE WORK

- Improve user data privacy
  - Confidentiality via crypto in user-defined groups
  - Monitor exfiltration of capabilities
- Ease adoption of data store API (see paper)
  - Client-side abstraction layer to support backend diversity
- Explore advertising avenues (see paper)

ALLOW TESTING GUARANTEES

- Raise level of trust between users and application providers
- Unplug to test out features present after End-of-Life (EOL)
- Provide audit mechanism
- Verify provider's claims wrt to functionality

APPLICATION CLASSES SUPPORTED

- Data View based Applications: Blogs, Photo Galleries are best suited
  - Peer-to-store connections allow sharing and commenting
- Local archives of previously viewed content
  - Preserve search with client-side indexing
  - Access to “friends” data can be kept
- Notifications via polling (fallback for live pub-sub)
- Server-side caching of user objects
- Server protocols (e.g. SMTP for webmail)

CONCLUSION

- Platform to handle service provider EOL
- Lose no benefits from central hosting
- Application can go in unplugged mode
- App`s dependence on the provider can be audited
- Demonstrated feasibility with several useful applications
- Performance of proto well within the bounds of usability