One Laptop per Child

Collaboration

Network Principles; Sync and Async

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Four steps

• Make our network sane (modularize)
• Asynchronous Collaboration: Journal
• Synchronous Collaboration: MPX/VNC
• Make it better
Networking Manifesto

• No Assumption of Universal Connectivity
• Direct XO-to-XO serverless communication
• Human-readable unique identifiers for each XO
• Direct presence interrogation
No Assumption of Universal Connectivity

- Every one is an island (of some size)
- Best service possible within our walls
Direct XO-to-XO communication

• Servers may be used as aides or proxies, but are never necessary
• Sockets and IP, like Jon Postel gave us
• Firewalls are there for a reason
  – But we can provide tunnels where needed
Human-readable ids

• Sometime I can tell my non-XO using friend
  – cscott.1cc-cambridge-ma.us.xs.laptop.org?

• Indirect, but globally unique.

• Maybe more than one name!
Direct presence interrogation

• Allow many discovery mechanisms
• Once discovered, direct means for presence
  – Rate and bandwidth limited
• More efficient alternates may augment
Brass Tacks

• The previous slides presented the principles
• Now let's consider an implementation
• You're welcome to suggest others!
DNS

• XOs are identified as:
  name.xxx.school.country.xs.laptop.org
  – Name: encoding of XO nickname
  – Xxx: only used for serverless bootstrapping
  – school....laptop.org: filled in by registration
Resolving

- Standard dynamic DNS to school server/other
- Map to link-local IPv6 by hashing
My friends

• Standard XMPP scheme for adding friends:
  – `xmpp:xo@nickname.xxx.school.country.xs.laptop.org?roster;name=Full%20Name`

• Internally: 'user@domain' (usually `xo@domain`)
  – Add protocol?
Presence

• Lightweight XMPP server on the XO for basic IM presence
  – Using SD-DNS redirection on school server if present

• Additional XO specific info?
  – Xmpp extensions, separate service?
  – Should not interfere with IM/VOIP interop
Asynchronous Collaboration

• Publish from the journal
• Let's see a demo!
• (I'm skipping a lot of the tagging stuff here)
Embedding demo (Firefox)
Bitfrost security

• Because the journal “file chooser” is out-of-process, untrusted apps don't need full access to user files

• The journal displays files, and then arranges to make available only the selected one

• We're also in the loop for saving, and can add metadata, etc.
I love Amazon

• Well, A9 at least
  – It died and gave us OpenSearch

• Publish journal as an OpenSearch provider
  – Can add to Firefox search bar

• Export results both as XHTML and Atom: subscribe using your favorite feed reader (or Firefox Live Bookmarks)
Feed demo

C. Scott's Journal: dir:/
Shared items from the Journal of C. Scott Ananian
by C. Scott Ananian

Results 1 to 9 of 7,729

One Laptop per Child by C. Scott Ananian
one laptop per child the journal reloaded one laptop per child dir c scott ananian talk date 1 existing journal design action view one laptop per child talk title c scott ananian talk date 2 existing journal design object view one laptop per child
categories: home; cananian; Projects; OLPC; git; journal2; X-SOURCE1;
localhost:8000/fetch/home/canianian/Projects/OLPC/git/journal2/journal2-talk.pdf

peru-notes by C. Scott Ananian;
peru notes.txt ed herman deployment tech team head victor head teacher jose antonio chang min ed university beta test team etc no laptops in luggage 50 spare laptops 10 replace ones with hardware problems we want back 40 university test owned maintained 8.2 20 english us returns
categories: home; cananian; Desktop; X-SOURCE1;
localhost:8000/fetch/home/canianian/Desktop/peru-notes.txt

journal2-talk by C. Scott Ananian;
journal2 talk scott ananian one laptop per child the journal reloaded existing journal design action view existing journal design object view what not to do a time travel file manager a little story &apos; s mold i use hierarchically structured paths everywhere but i couldn&apos;t convince the young

C. Scott's Journal: dir:/
Shared items from the Journal of C. Scott Ananian

screenshot-ff
10/15/2008 05:36 PM

screenshot ff.png

One Laptop per Child
10/15/2008 09:39 PM

one laptop per child the journal reloaded one laptop per child dir c scott ananian talk title c scott ananian talk date 1 existing journal design action view one laptop per child talk title c scott ananian talk date 2 existing journal
Brain-dead collaboration

• In Friends view, right click to “See Chris' shared files”

• Journal view, just like your own Journal
  – Results come via published Atom feed
  – If we're careful, results are offline cachable
Blogs

- Your published RSS feed is a very simple blog, readable from non-XOs, for free.

- For a little more control, tag some of your objects with the “blog” tag, and publish the search “in:blog” as your blog feed.
Network principles

• Hard part here is naming the remote XO
  - But that's what the first part of the talk was about!

• Blog url is:
  http://cscott.1cc.xs.laptop.org/

• See:
  http://wiki.laptop.org/go/Network_principles
Synchronous Collaboration

- **Goal:** some collaboration in every activity
- VNC does great, already exists
- "Launch activity in VNC session"
- MPX is the next step
  - Move my pointer on the other kid's screen
Do better

• Journal & MPX are not the only collaboration available
• Do better activity-by-activity
• Being able to directly represent buddies and directly connect is a great start
Next steps

• Emulate the existing Dbus-like Telepathy API

• Simple APIs for complex tasks (cf Ben Schwartz)
Bonus Slides

• Here be dragons; enter, wizards!
Depths of network jungle

• Tunnels
• Split DNS
• Security
Tunnels

• When I register with my school server (or xofriends.org) I might get back some tunnel information
• I can establish an IPv6 tunnel using this to bypass NAT and allow my class to collaborate
• School-to-school tunnels to allow penpals
Split DNS

• cscott.1cc.xs.laptop.org might resolve to one thing at school, and something else at home

• Allows school server to remain firewalled off from external networking, without requiring students to use new identity at home

• Also provide tunneling?
XO-to-XO security

• When I befriend mstone, I might obtain a public key from him

• Lookups of mstone.1cc.xs.laptop.org notice the keypair and lie to me
  – They give me a localhost IP address

• Now connections to mstone get proxied
  – Verify that mstone is authentic
  – Protect content of communication
Asynchronous web

• We want to cache web content for offline use

• But these will still trigger DNS lookups
  – One solution is to provide “offline DNS” server as well, or use explicit proxy
  – OR: School server can provide unique link-local IPv6 addresses in response to query
  – Server (or peer) answers connections to these and responds
Bonus: reinventing .xol

- Define structure for cached web content

- Most .xols have two parts:
  - Push some content in the offline cache
  - Indexing information: sidebar links, etc

- But why not just push this into the .xo format
  - And kill the .xol
Super bonus: requests

• Once we have a cache, there will be misses
• How do we collect the misses...
• ...and fulfill them next time we have connectivity
• ...or our teacher has connectivity