“I want a thousand guitars
I want pounding drums
I want a million different voices
Speaking in tongues”
Naming Problems

- Naming network resources and services is a big mess
The Solution

• Name everything “peachtree”

• QED
Naming Problems

- Naming network resources and services is a big mess
Naming Problems (cont.)

- Problem #1: names are obtuse
- Problem #2: names are hard to share

http://www.flickr.com/photo_zoom.gne?id=1131208946&size=o&context=photostream
Naming Problems (cont.)

• Problem #3: names are globally unique, but ambiguous to people

• What is asu.edu?
  • Arkansas State University?
  • Alaska State University?
  • Arizona State University?
  • That fabulous little Division I-AA school in Boone, NC?
Naming Problems (cont.)

• Problem #4: names are intolerant of location change

mallman@cs.ohiou.edu  mal37591@ohiou.edu

mallman@lerc.nasa.gov  mallman@bbn.com

mallman@grc.nasa.gov

mallman@icir.org

mark.allman@case.edu
Naming Problems (cont.)

• Problem #5: naming is under nobody’s control
  • Service providers play a part
    • E.g., “www.blogspot.com”
  • Content providers play a part
    • E.g., “MyGreatVacationPictures.html”
  • Consumers play a part
    • E.g., “Joe’s Blog” in the bookmarks list
Naming Problems (cont.)

• But, we cope ..... 
• Address books 
• Bookmarks 
• “Mail this web page” 
• Clicking URLs 
• Google 
• Social networking sites 
• Is there a better way?
Related Work

• Much naming literature ....
  • How to name hosts
  • How to name services
  • How to name data
  • Personal or group naming realms

• All good stuff but issues remain
A Naming Layer

- Perhaps what we need is a new over-arching namespace
- Just an abstraction to existing namespaces
A Naming Layer (cont.)

• Give users’ a way to name their own resources
  • Independent of resource/service location
  • With context sensitive names
  • Scoping defined by the user
    • Public vs. private
Overview

• Every *pnames* user gets a namespace
  • Identified by a *namespace ID* (NID)
  • NID is a hash of the public half of a locally generated keypair
Overview (cont.)

• Each namespace can contain:
  • Simple names
    • E.g., “calendar = webcal://cal.mallman....”
    • E.g., “email = mallman@icir.org”
    • E.g., “aim = myAlMhandle”
  • Pointers to other namespaces
    • E.g., “Joe = NID:7a6b623df1”
Example (cont.)

- Mark can use:
  - Dad:blog
- Wes can use:
  - Mark:vacation-pix
  - Mark:web
Sharing Names

• Scheme #1: sharing through a DHT
  • Hash key composed of NID, name and type
  • Value is the actual resource name

key = MA_NID + "blog" + "rss"
put (key,"http://foo.blogspot.com/feed.xml")
blog_url = get (key)
Sharing Names (cont.)

• This scheme works on a per-name basis, not a per-namespace basis

• I.e., lookups do not retrieve all the names someone makes available
Sharing Names (cont.)

- Scheme #2: names could be swapped without using a DHT
  - However users now informally share data
Bootstrapping

- Key problem: NIDs are *more obscure* than any other sort of name we already use
  - Makes them *harder* to share
  - Makes pointer records crucial to the system
Bootstrapping (cont.)

- Swap NIDs any way information is shared now
  - Email signatures, web pages, vCards, etc.

- Could also setup \textit{pnames} registeries where users could add pointers via some web page
  - E.g., “WellKnownRegistry:MarkAllman”
Reliability

• Adding a new naming layer adds a new point of failure

• We combat this in two ways:
  • DHTs are robust
  • Heavily use caching and pre-fetching
Security

- Names can be validated as belonging to the given namespace by checking signatures
- Given crypto usage is required we can encrypt records we want to share only privately
- DHT is robust to some kinds of DoS attacks since it is a distributed data structure
- Of course, different attacks may leverage homogeneous software in a tightly coupled system
Final Thoughts

• Pnames is a simple new abstraction
  • Do we need it?
  • Is it solving a problem we have?
• Are our current coping mechanisms Good Enough?
“Is there anybody alive out there?”
Extra Slides
A Different Namespace

- Pnames is not strictly scoped to *people*
  - E.g., organizations could build a namespace

- What are the implications?
- Who is authoritative if “google.com” resolves differently in different environments?
OpenDHT Performance