Principle: Names and Addresses

Name vs. Address

- Name: specifies what something is
  - Office: Philip Levis' office
  - Host name: market.scs.stanford.edu
  - Memory: list_ptr
- Address: specifies where something is
  - Office: 412 Gates Hall, 353 Serra Mall, Stanford, CA 94305-9040 USA
  - IP: 171.66.3.9
  - Memory: 0x0040005080
- Telephone numbers: names or addresses?
- This is not a hard classification, just a conceptual model

Names

- Structure of names affects what you can reference (easily)
- Flat names
  - Stock tickers (GOOG, MSFT), airport codes (NRT, YYZ)
  - Services: http, ftp, https
  - Skype IDs
- Tuple pairs
  - Gender: Female; Name: Jennifer Widom; Position: Department Chair
- Hierarchical names
  - maps.google.com
  - Nick McKeown, Professor of Electrical Engineering and Computer Science, Stanford University

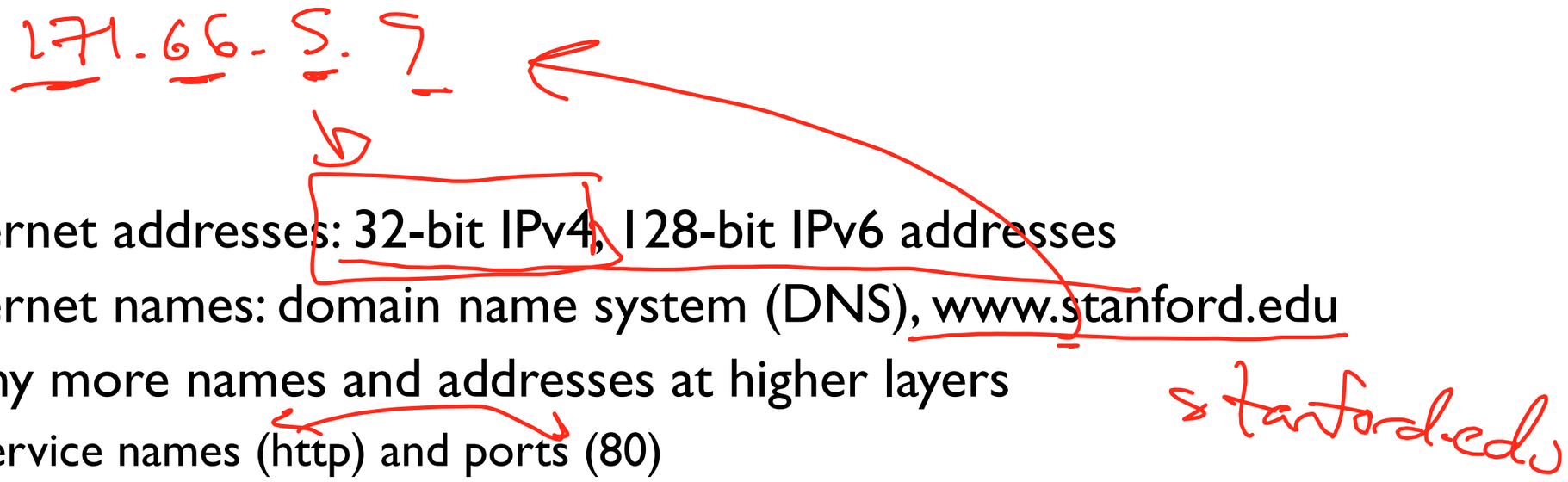
Addresses

- Structure of addresses affects what you can reference (easily)
- Flat addresses
  - Memory (0x040004400)
  - Port numbers (80, 21, 443)
- Tuple pairs
  - x=32, y=100, z=88
  - latitude=45.211W, longitude=48.111N
- Hierarchical addresses
  - Memory segments (0x1000 in segment 0)
  - 412 Gates Hall, 353 Serra Mall, Stanford, CA, 94131 USA

Downloading a File

- How does one refer to the file?
- Address: http://csl.stanford.edu/~pal/pubs.html
  - Refers to what host the file is on
  - Refers to where on the host's file system the file is
- Name: take a hash of pubs.html: 0x27de2b6939d7fb4b0573dbd6dbe2c740
  - Request the file (using a different protocol than http) with hash
  - If file changes, hash changes
  - Says nothing about where the file is

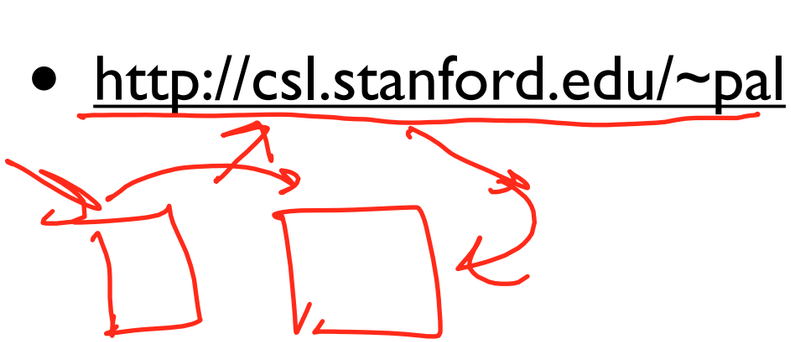
Internet Names and Addresses



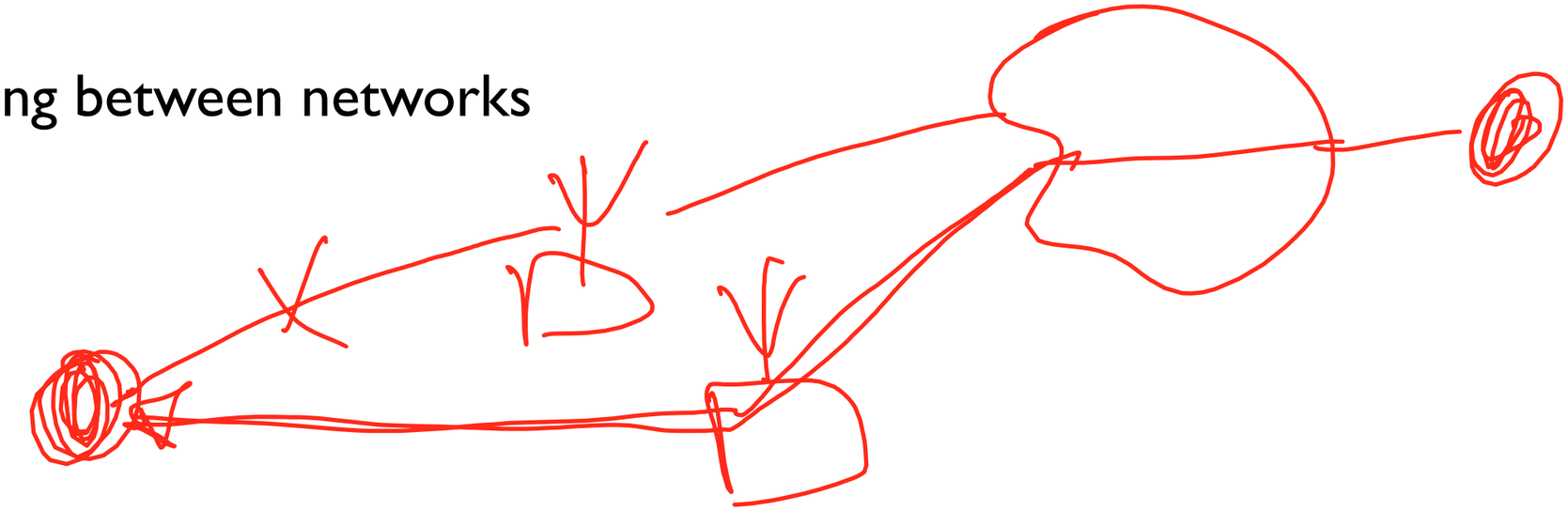
- Internet addresses: 32-bit IPv4, 128-bit IPv6 addresses
- Internet names: domain name system (DNS), www.stanford.edu
- Many more names and addresses at higher layers
  - Service names (http) and ports (80)
  - SIP identifiers (pal@a.com) and email addresses (pal@a.com)
- Internet Corporation for Assigned Names and Numbers (ICANN)
  - Internet Assigned Numbers Authority (IANA)

Two Examples

- http://csl.stanford.edu/~pal vs. http://171.64.73.43/~pal



- A user moving between networks



Principle

- Whether you name or address something has deep implications to how your network and or protocol can be used.
- The structure and design of those names and addresses also have deep implications.