Unified Network Information Services

Things we are doing that perfSONAR can use

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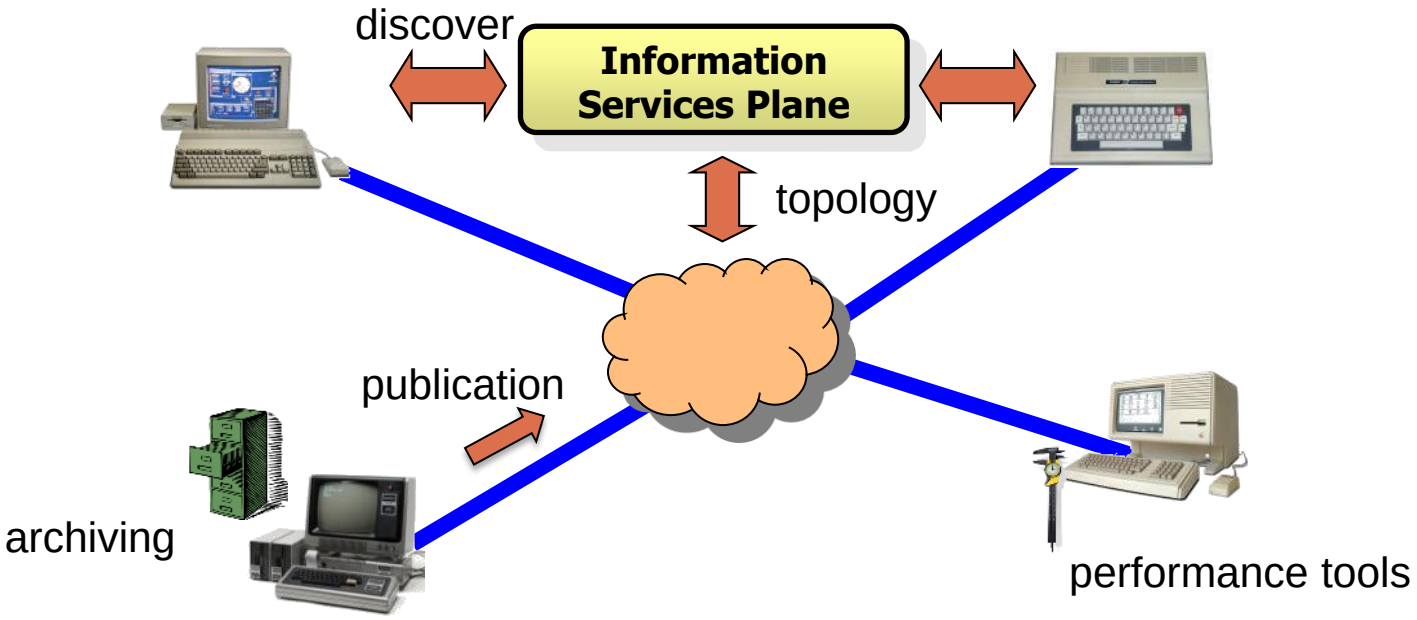
UNIS is an information services plane

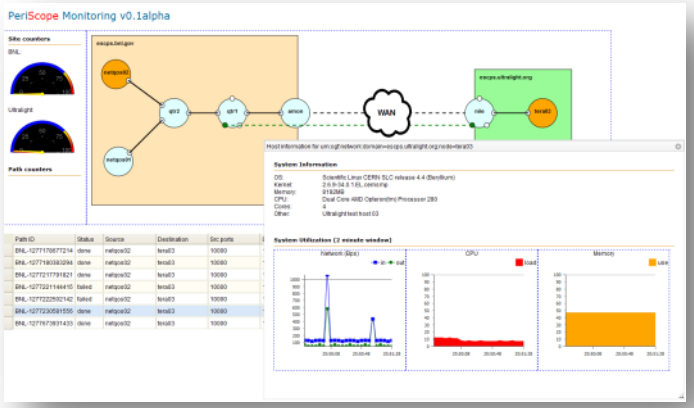
- Project UNIS – Unified Network Information Services

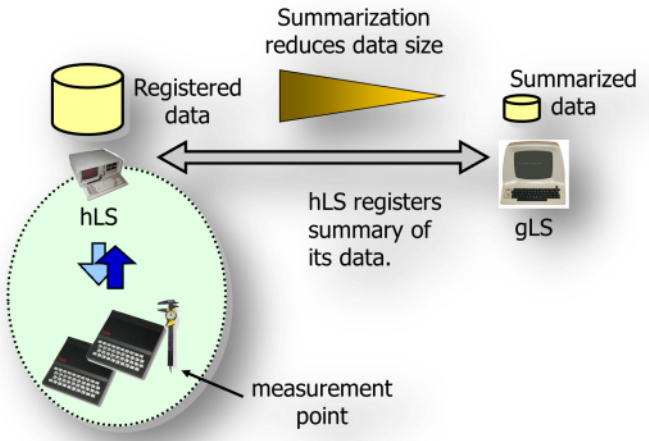
- Distributed software architectures use the Information Services plane to discover “meta” information within the network.
- This information services plane facilitates discovery of network topology, location, and capabilities of network services.



Some UNIS projects

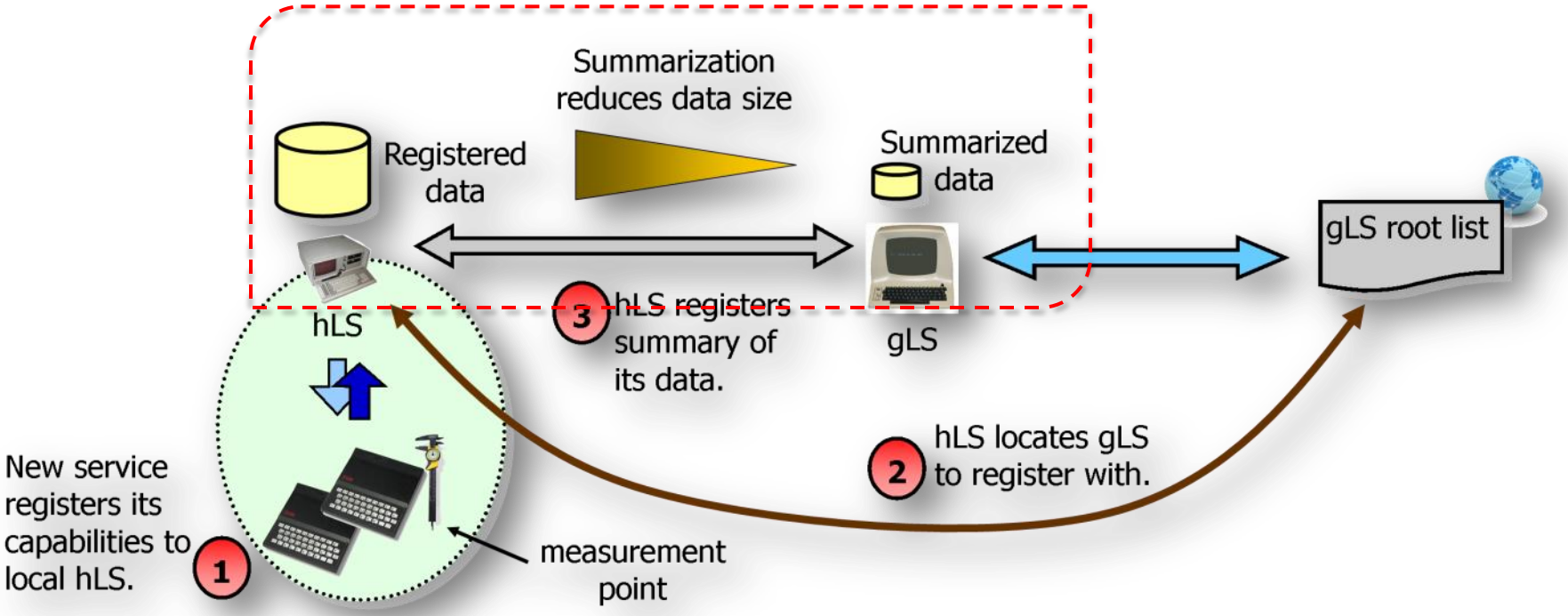
- UNIS proposes solutions for information services necessities.
  - UNIS topology schema. Used in:
    - Performance measurement infrastructures (perfSONAR);
    - Dynamic circuit networks (ESnet SDN, Internet2 DCN, ION, GÉANT AutoBAHN, Phoebus);
    - Experimental infrastructures (GENI).
  - Periscope: graphical control panel tool, caching service, domain-specific topology schema normalization.
  - New heuristic for IP summarization for perfSONAR Lookup Service.





Lookup Service conveys a distributed directory for services

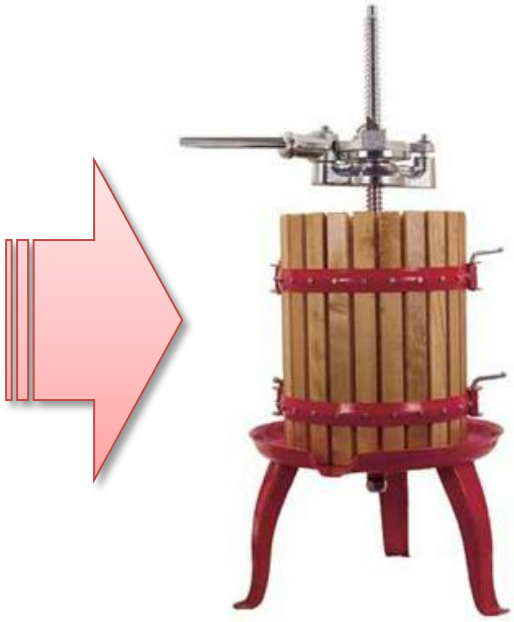
- The Lookup Service (LS) is a distributed directory, composed of levels.
  - Local directories (hLS): point to local services (measurement tools, archives).
  - Global directories (gLS) of local directories (all gLSs are synchronized).



New heuristic for IPv4 summarization

- Our heuristic summarizes a list of IP addresses by employing *IP subnet addresses* to represent the actual host IP addresses controlled by an hLS.

198.129.248.121
134.55.217.89
134.55.219.9
134.55.209.41
134.55.218.5
134.55.213.205
134.55.213.74
198.124.194.9
134.55.42.10
134.55.208.126
198.124.216.157
134.55.217.82
134.55.42.18
198.124.238.1
134.55.217.6
134.55.200.74
192.168.201.5
192.107.175.3
134.55.222.62
134.55.221.42
134.55.218.70
134.55.217.113
…

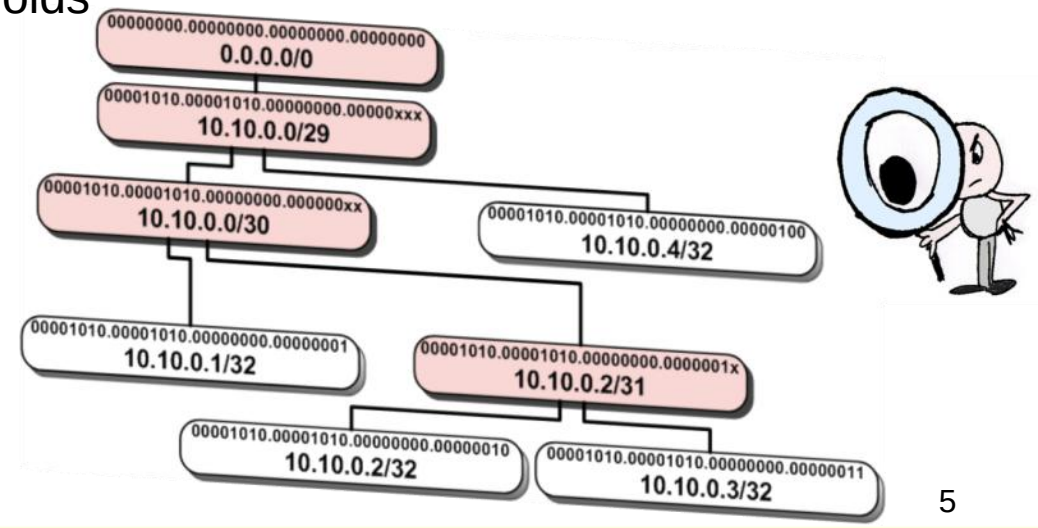


IP summarization heuristic engine

134.55.0.0/16
134.167.160.49/32
138.18.155.22/32
192.0.0.0/9
192.150.29.210/32
192.150.31.78/32
192.168.201.0/26
192.188.106.140/32
198.0.0.0/8

How does it do it

- The heuristic constructs a special data structure – a PATRICIA tree – within which the *inner nodes* are the *subnet addresses*, and the *leaves*, the actual *host IP addresses*.
- Uses three metrics to decide which inner nodes to pick:
  - **Distance**: notion of how many IPs a subnet claims, but do not actually exist in the network;
  - **Density**: number of actual IP addresses over total number of possible IPs in a subnet;
  - **Minimum Subnet Mask**: avoids too large subnets.
- User-controllable by two parameters.



How it integrates with perfSONAR LS

- Two parameters to control the summarization algorithm (implemented through the file *daemon.conf*):
- **summarization_granularity**: Controls the granularity or coarseness of the summarization. Accepts values from 0 to 3:
  - 0 → finer summarizations; more summarizing nodes.
  - 3 → coarser summarizations; fewer summarizing nodes.
  - Default = 1.
- **summarization_minMask**: Controls the minimum mask that a summarizing node must have. Accepts values from 0 to 32 (IPv4).
  - Default = 8.

New LS version is currently in perfSONAR-PS test branch

- Volunteers to deploy and test?
- This presentation and UNIS poster are available at:
  - http://www.cis.udel.edu/~portnoi/publications.html
- More about the new IP summarization heuristic at perfSONAR wiki:
  - http://code.google.com/p/perfsonar-ps/wiki/IPSummarization
- More about UNIS at Information Services Working Group:
  - http://spaces.internet2.edu/display/ISWG/Home

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