Developing a Unified Network Information Service

Ahmed El-Hassany, Ezra Kissel, Martin Swany

Indiana University

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What is UNIS?

- UNIS – Unified Network Information Service is a general directory service
  - Think DNS – find what exists and how to contact it
  - Provides more details about the network and services
- The “unification” in question is that of the perfSONAR Lookup Service and Topology Service (“United”)
  - Implementation-wise, they are very similar
  - The LS is used for service location and metadata and the TS is primarily used in OSCARS
  - The perfSONAR architecture has other use-cases
  - We assert that distributed network CI needs one

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Software

- Key goal: update the perfSONAR Lookup Service
  - Very successful, but frozen. Must not become an impediment to growth!
  - ESnet is leading the charge!
- Update from Web Services of 2003 to 2013
  - XML over SOAP - XMLDB seemed like a good idea at the time…)
  - RESTful interfaces JSON over HTTP with noSQL backend (GET, PUT, POST, DELETE)
  - Simple syntax translation – objects are the same

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Unified

- As mentioned, the implementations of the LS and TS are similar
- More importantly, the information models are related, intertwined
- Not just a list of services and how to contact them, but a network graph annotated with the services
  - Not only services like perfSONAR MAs and MPs, but the services offered by network devices

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UNIS Elements

- Network Resource (Lifetime, Location)
- Node, Port, Link
- Network (-> Node), Path (-> Link)
- Layer/technology specific attributes
  - Different for Optical, Ethernet, IP

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GENI

- Our work in GENI (GEMINI and LAMP) is to extend perfSONAR in an implementation we call Periscope
  - Collaborators at LBL: Dan Gunter, Taghrid Samak
- First unification of LS and TS with integral AA
  - SSL and ABAC
- Integration of new metrics including L2 circuit metrics developed as part of DOE-funded ESCPS (with FNAL and BNL)
- Configuration of running services like Windows Registry

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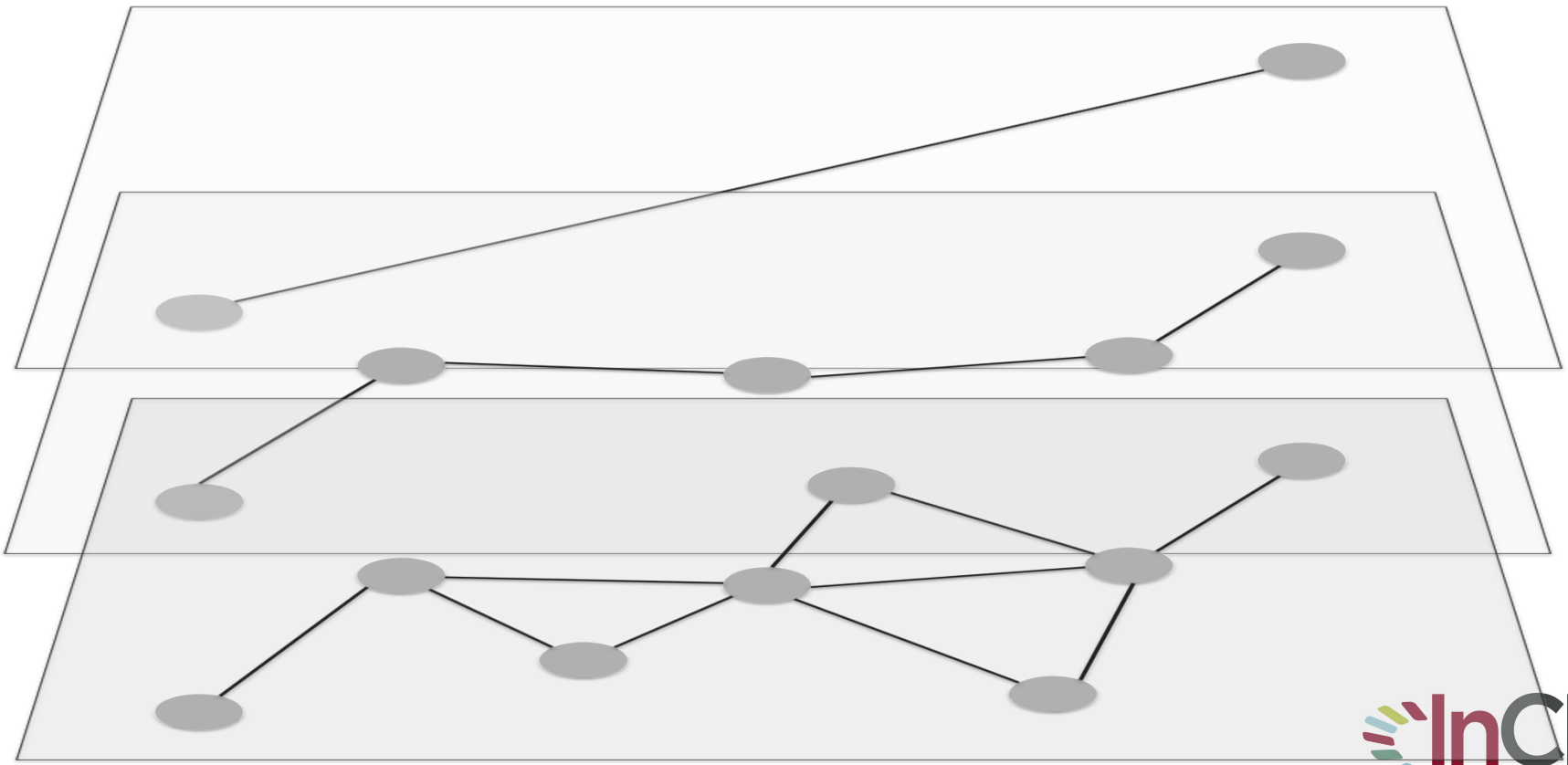
Network Topology

- Multi-layer network topology
  - Metadata for measurements
  - Interconnection information
  - Path information (Pathfinding, troubleshooting)



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Northbound Interface for SDN

- We believe that a RESTful network topology interface is a natural northbound interface for application interaction with SDN
  - Many others in the community agree
- Ezra Kissel's talk yesterday highlights SDN peering
  - Same basic topology elements
  - New layer for flowspace (once authenticated, you see your view of manipulatable flowspace

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New Work: *flange*

- Domain specific language for representing and programming networks
- Functional reactive model
  - Programming the forwarding function
- Declarative network configuration
  - Network-wide invariants

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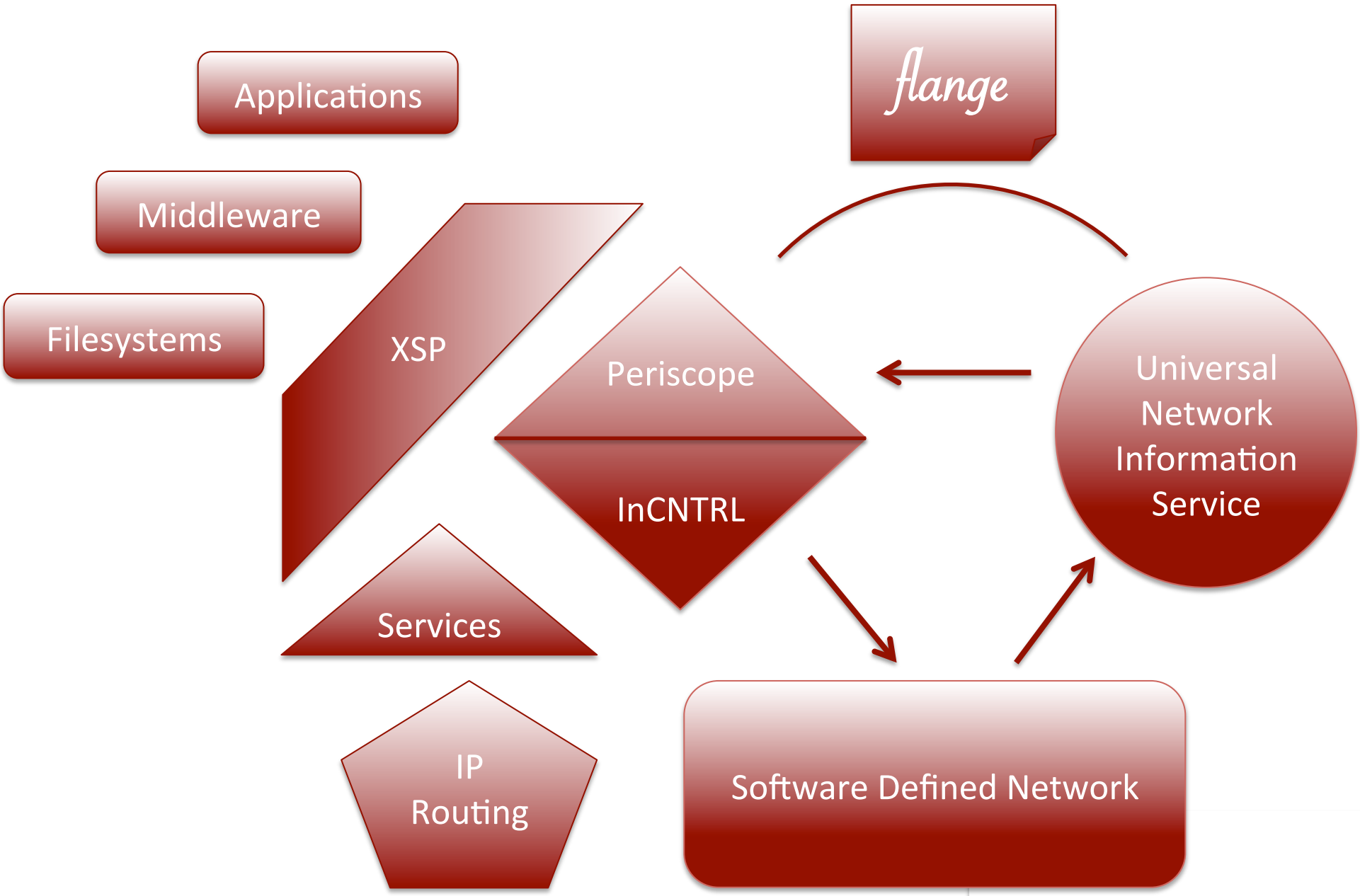
InCNTRE SDN Architecture



Summary: UNIS is general CI

- perfSONAR – measurement metadata, service configuration
- OSCARS/OESS – topology for pathfinding
- SDN Peering – inherent multilayer representation
- Phoebus – accelerator location
- CC-NIE – Globus Online, Data Logistics Toolkit with Vanderbilt and UTK

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Questions?

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