A Network Use for Incomplete Knowledge Management

Anduo Wang
Temple University
declarative networking
- declarative programming
- distributed datalog


2006
network innovation by database

declarative networking
- declarative programming
- distributed datalog


[Communications of the ACM] Abstractions for Software-defined Networks 2013

network programming APIs
- imperative
- centralized
Onix: a distributed control platform for large-scale production networks

early software-defined networks (SDNs)
- network information base (tables)
- transactional processing

[OSDI] Onix: a distributed control platform for large-scale production networks

2006
2010
2013
network innovation by database

early software-defined networks (SDNs)
- network information base (tables)
- transactional processing

[OSDI] Onix: a distributed control platform for large-scale production networks

[HotSDN] ONOS: towards an open, distributed SDN OS

production-scale control platform
- distributed key-value store
- optimized for frequent updates
Checking Beliefs in Dynamic Networks

- high-level reasoning
- general modeling
- data provenance tracking

network innovation by database
network innovation by database

high-level reasoning
- general modeling
- data provenance tracking

practical network verifiers
- specialized model
- heuristic reasoning engine

[NSDI] Checking Beliefs in Dynamic Networks

[SIGCOMM] Accuracy, Scalability, Coverage: A Practical Configuration Verifier on a Global WAN
a mixed success

database: elegant notions

imperative programming and distributed system: performance, scalability
find a networking problem that cannot be easily addressed by other means?

incomplete knowledge in networking

- has been inherent, prevalent, and will likely to persist
- little native/systematic support in current networks
incomplete network knowledge

operating region analysis

querying incomplete database
incomplete network knowledge

https://github.com/ravel-net/Faure

our contribution: a datalog extension (fauré-log) for incomplete information,
static analysis with fauré-log evaluation
incomplete network knowledge

operating region analysis

querying incomplete database

constraint checking in distributed database?

new path safe?

independent domain
incomplete network knowledge

operating region analysis

querying incomplete database

compute test coverage

constraint checking in distributed database?

semistructured data?
<table>
<thead>
<tr>
<th>database solution</th>
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### Recap — Manage Incomplete Network Knowledge

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thank you