Chair of Connected Mobility
Department of Computer Science
Technische Universität München

Some Thoughts on Mutable Data in ICNs

Object security and protected object manipulation in "caches"

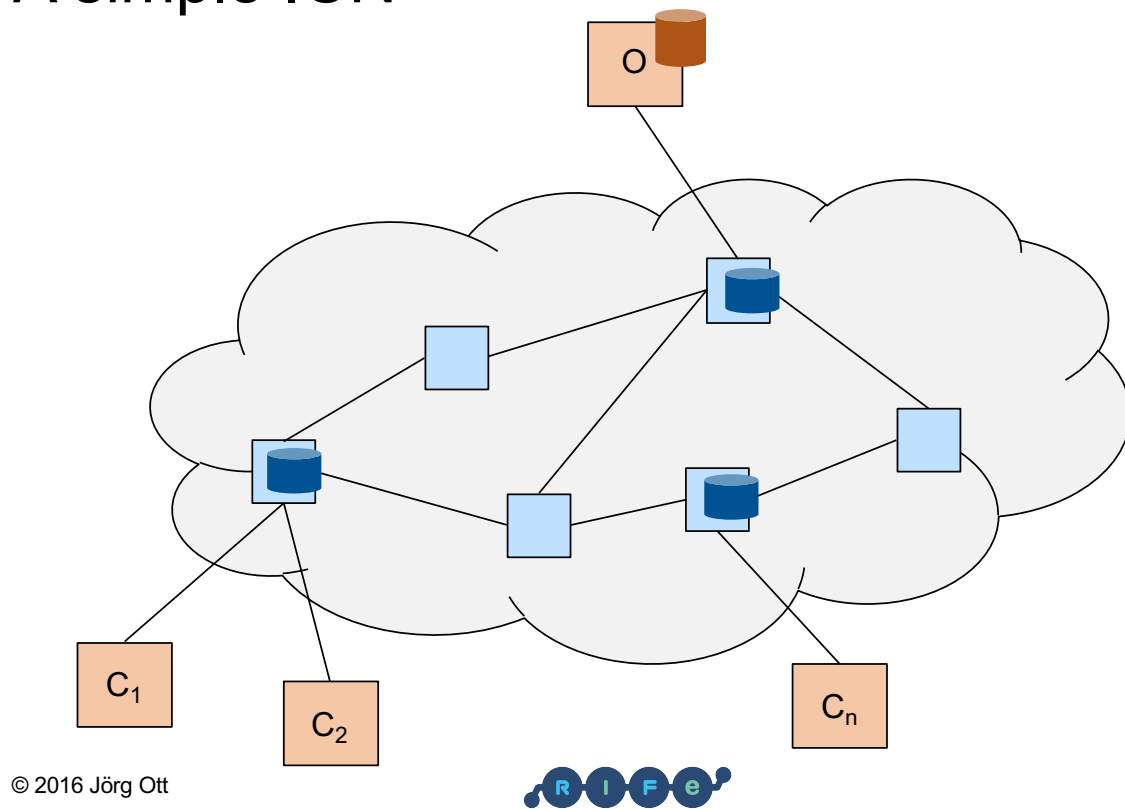Arseny Kurnikov, Marcin Nagy, Teemu Kärkkäinen, Jörg Ott
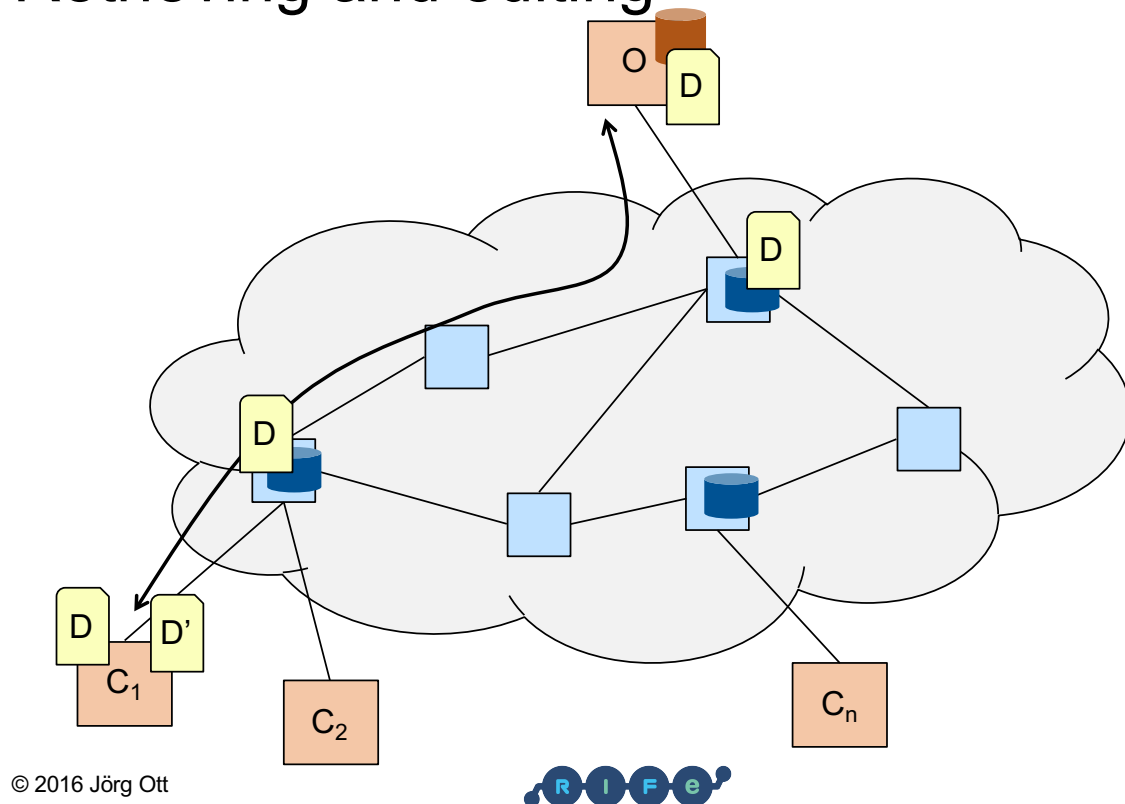
17 July 2016

ICNRG @ IETF 96

Turn off you CCN/NDN/whatever
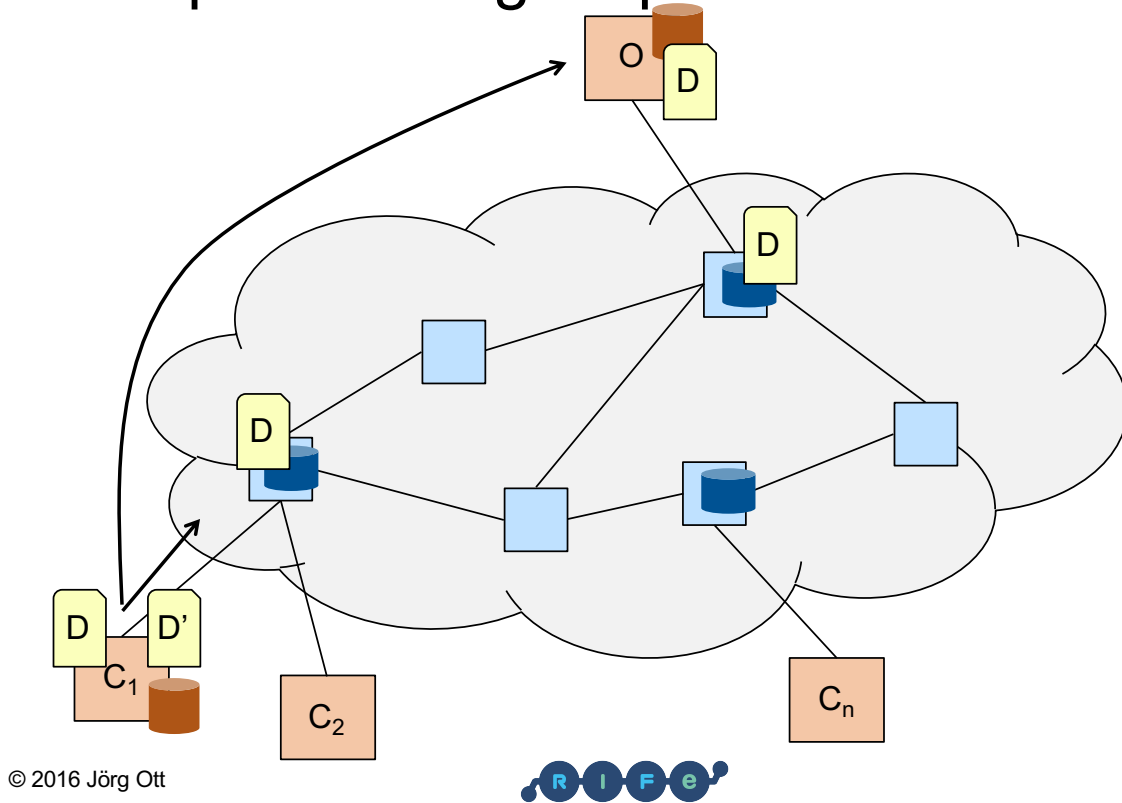
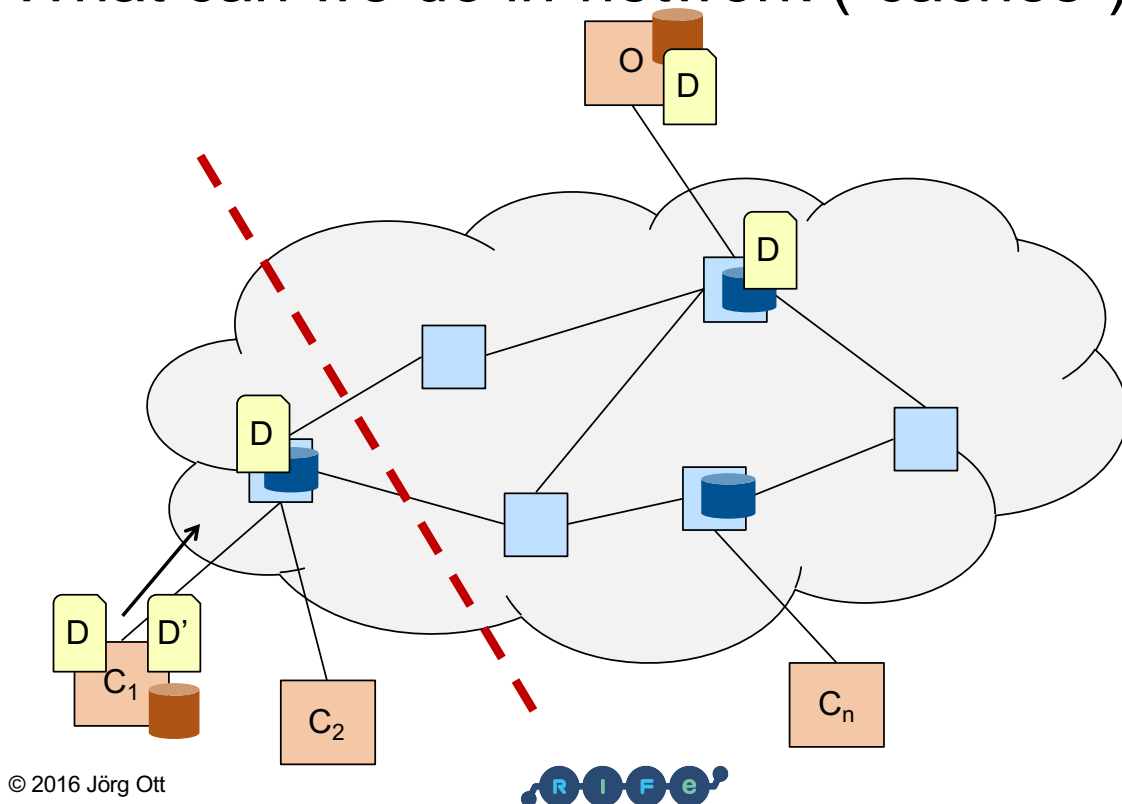# assumptions for now…

A simple ICN

Retrieving and editing

Local pub vs. origin update?

# What can we do in-network ("caches")?

Two questions:

- How to enable in-network updates (in "caches")?

- How to synchronize state across replicas?

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- How to enable in-network updates (in "caches")?
  - Defining who is allowed to perform modifications
  - Defining which nodes can reconcile modifications

- How to synchronize state across replicas?
  - "git something"
  - Separate can of worms we are looking into

Managing Permissions for Mutable Data

Web model

Content-centric model

Data

ACL

A

B

C

Data

ACL

DML
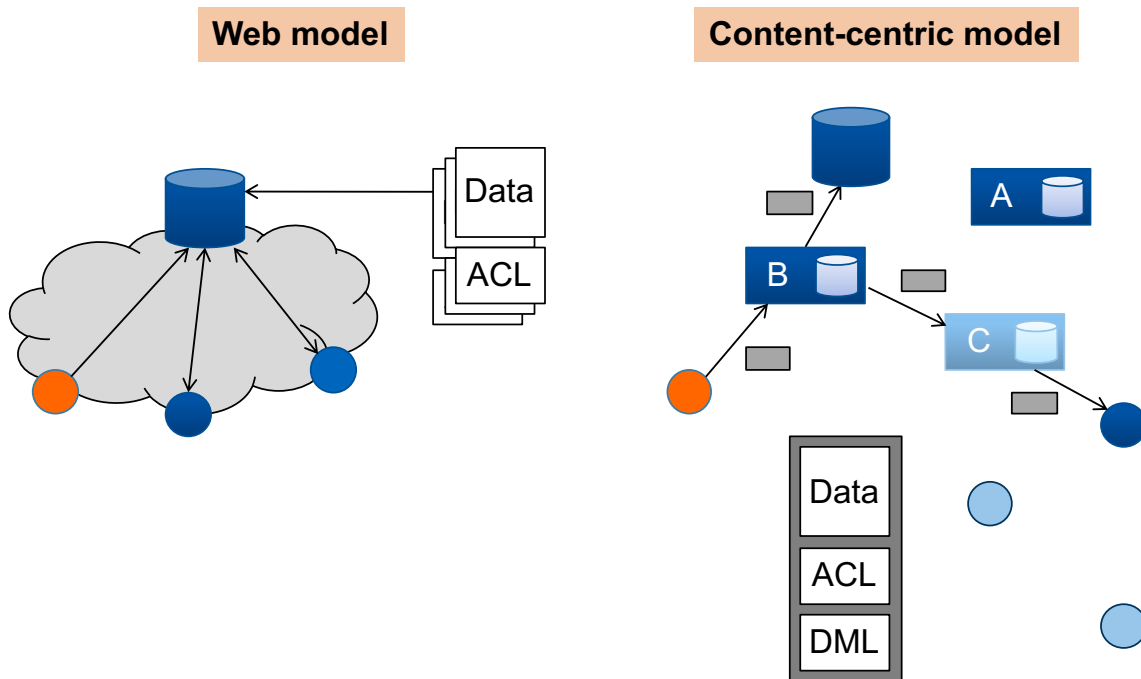
Certificates and Proxy Signatures

- Assumption: at least one local certification authority
    - Low volume certificate + CRL distribution

- Objects (documents) are signed by the "owner"

- Proxy signatures
    - Owner entitles other nodes to perform actions on its behalf
      (read: perform content modifications)
    - "Caches": designate who may carry out content updates
      (adoption or merge operations)
    - Clients: designate who is allow to submit content update requests
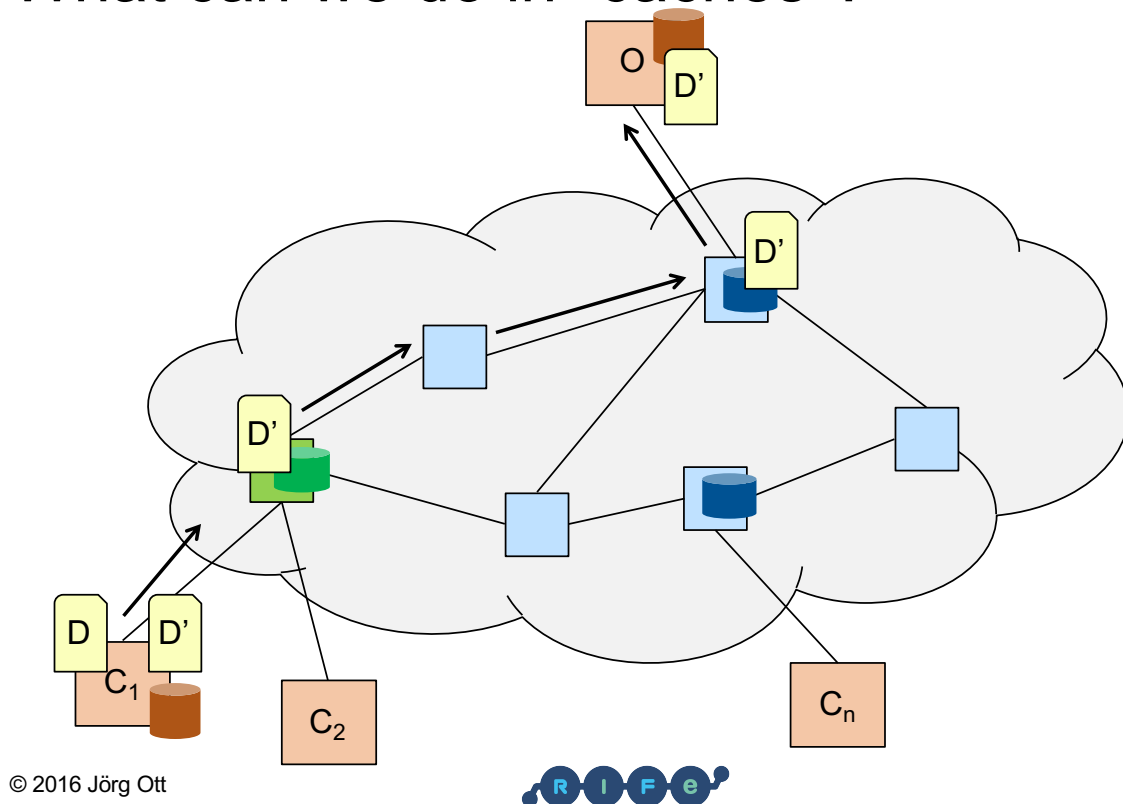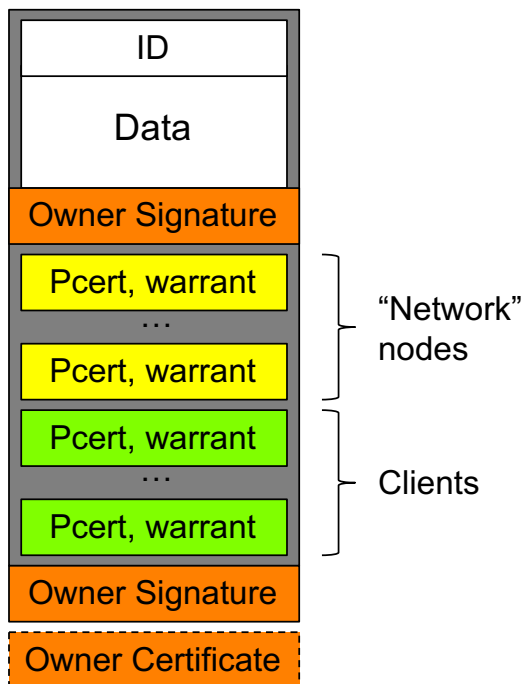   (add/delete/edit parts)
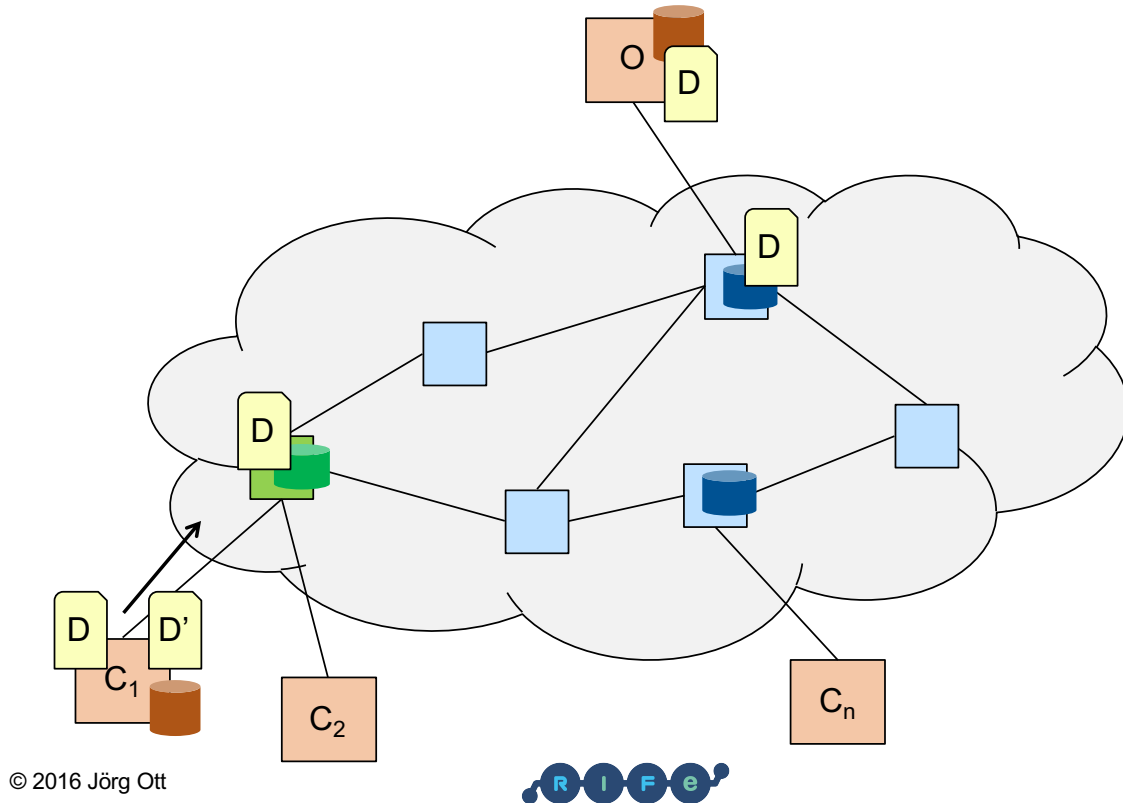
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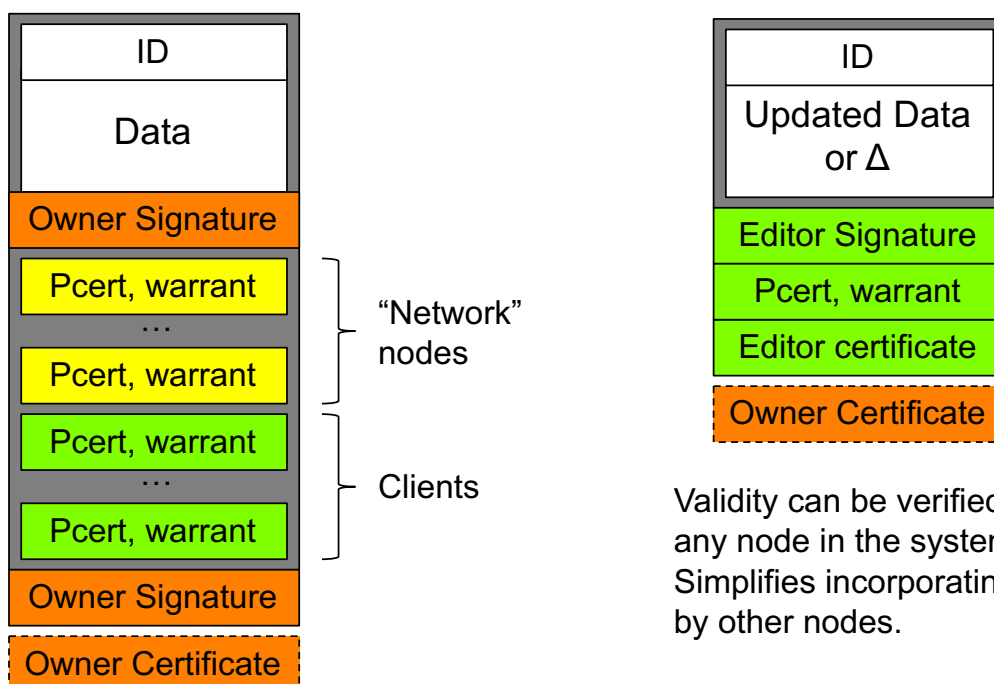
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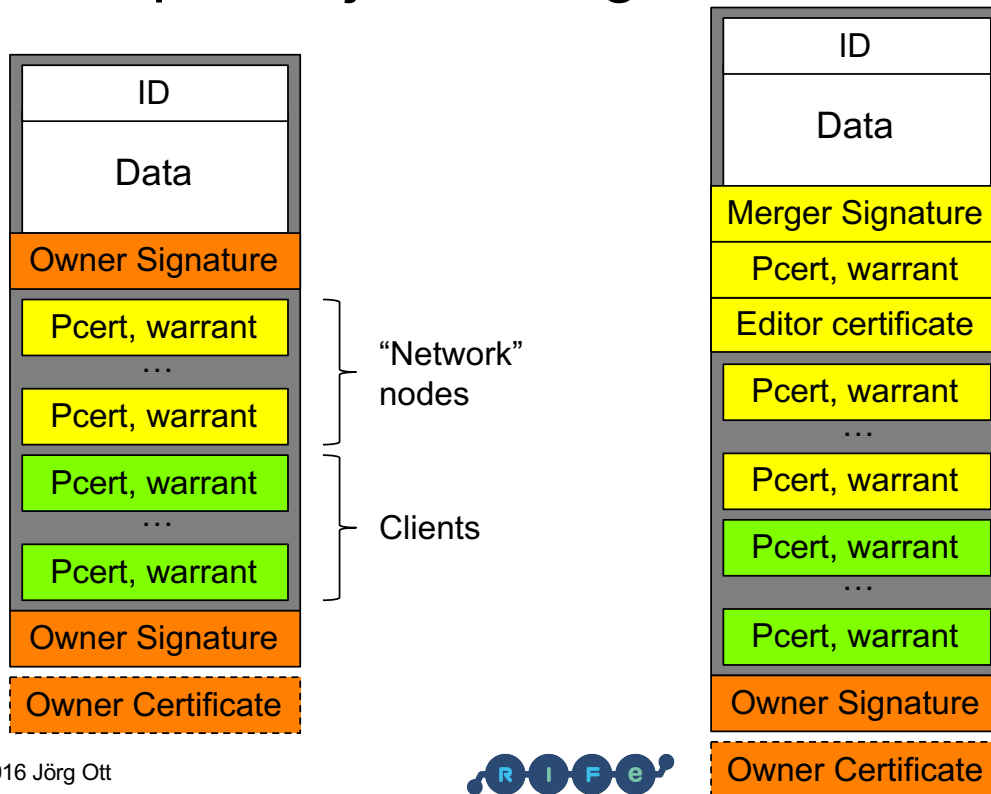
A Sample Object

A Sample Object: Modification Request

Validity can be verified by any node in the system. Simplifies incorporating edits by other nodes.

A Sample Object: Merged Edits

Evaluation in Progress

- Built a distributed "Google Docs"-style application

- Quantitative evaluation in progress
  - Different editing models
  - Different update distributions

- Looking at different simulation topologies

- Synchronization
  - Evaluating different merge algorithms
  - Looking at placement tradeoffs