Thoughts on GNI and GNS-WSI update

G-lambda project

http://www.g-lambda.net/

National Institute of Advanced Industrial Science and Technology (AIST)

KDDI R&D Laboratories,

NTT Network Innovation Laboratories,

National Institute of Information and Communications Technology (NICT)

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Note: Some of the topics in this talk are under discussion in the G-lambda project and not final

GNS-WSI and G- lambda project

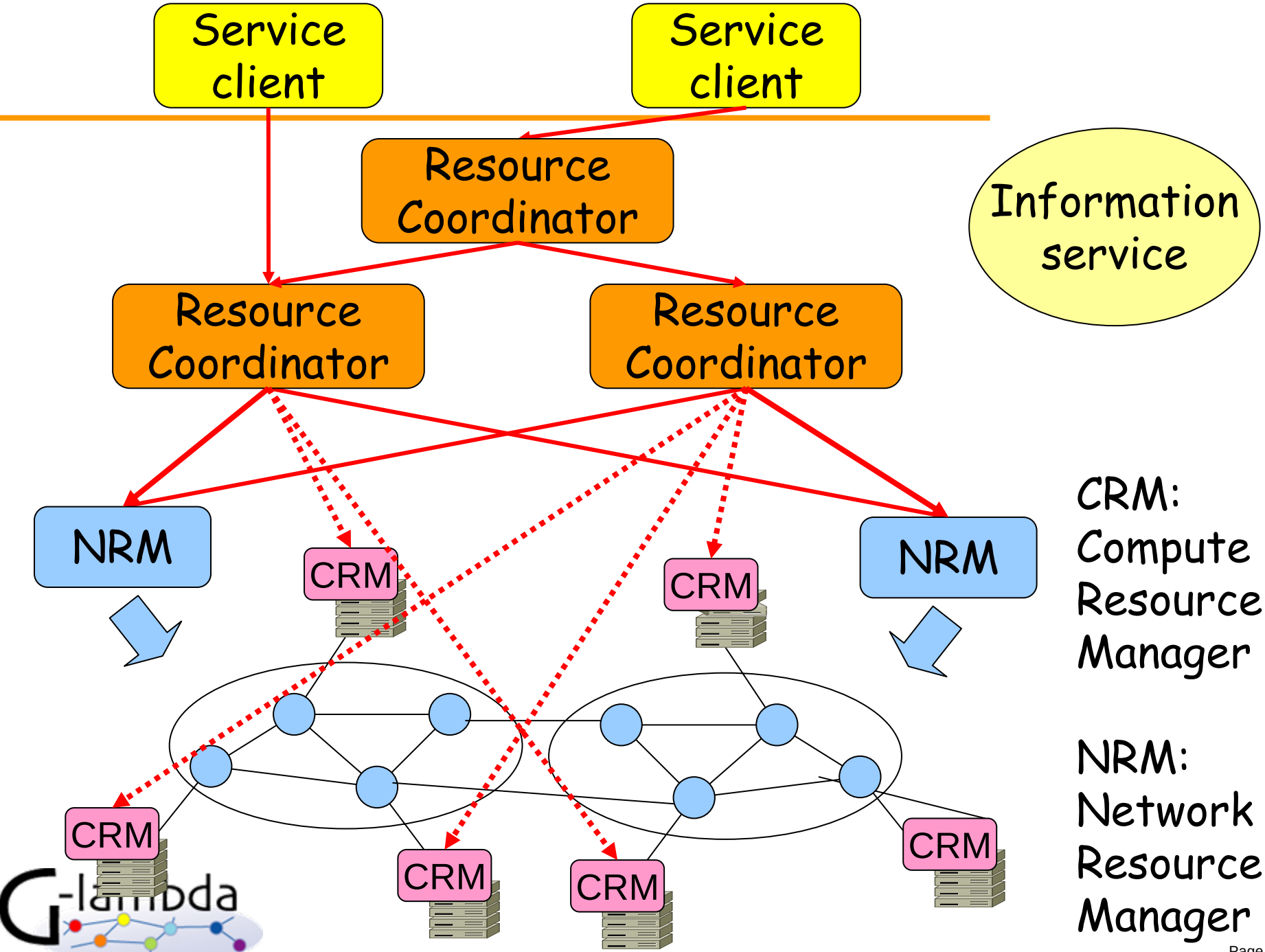
- GNS-WSI
  - Grid Network Service / Web Services Interface
  - An interface to reserve bandwidth between end points
  - Unified interface for other resources such as computers
  - A standard web services interface between resource coordinators and network resource managers
  - Assume network services provided by network operators.
  - Used in the GLIF2006/GLIF2007 demo with EnLIGHTened
- G-lambda project
  - Joint project of KDDI R&D labs., NTT, NICT and AIST.
  - Started in December 2004.
  - Objective is to define and promote GNS-WSI

GNS-WSI

- GNS-WSI is a web-services interface and uses WSRF.
  - WSDL definition of the interface
- GNS-WSI functionality
  - Basic operations: reserve, cancel and modify
    - Resource information query functions to be extended
  - 2-phase commit protocol
  - Per-request hierarchical architecture
  - Authentication policy: delegation and agency
    - GSI (Grid Security Infrastructure) based authentication / encryption)
  - Policy based information service

GNS-WSI Assumptions

- Resources are provided by multiple domains
  - Relationship among domains can be hierarchical (layered)
- There can be different types of domains
  - A domain with network resources only (c.f. network operator)
  - A domain with computing resources only (c.f. data center)
  - A domain which only has coordination functions (c.f. agent)
  - A domain with both network and computing resources (c.f. research institutes)
- Some resources may be provided as a commercial service (commercial domain)
  - Do not want to give control of their networks to others
- Information (such as availability) of resources is not always disclosed to everyone
  - Information is provided based on a contract with each client
  - Policy based information service


Service client
Service client
Resource Coordinator
Information service
Resource Coordinator
Resource Coordinator
NRM
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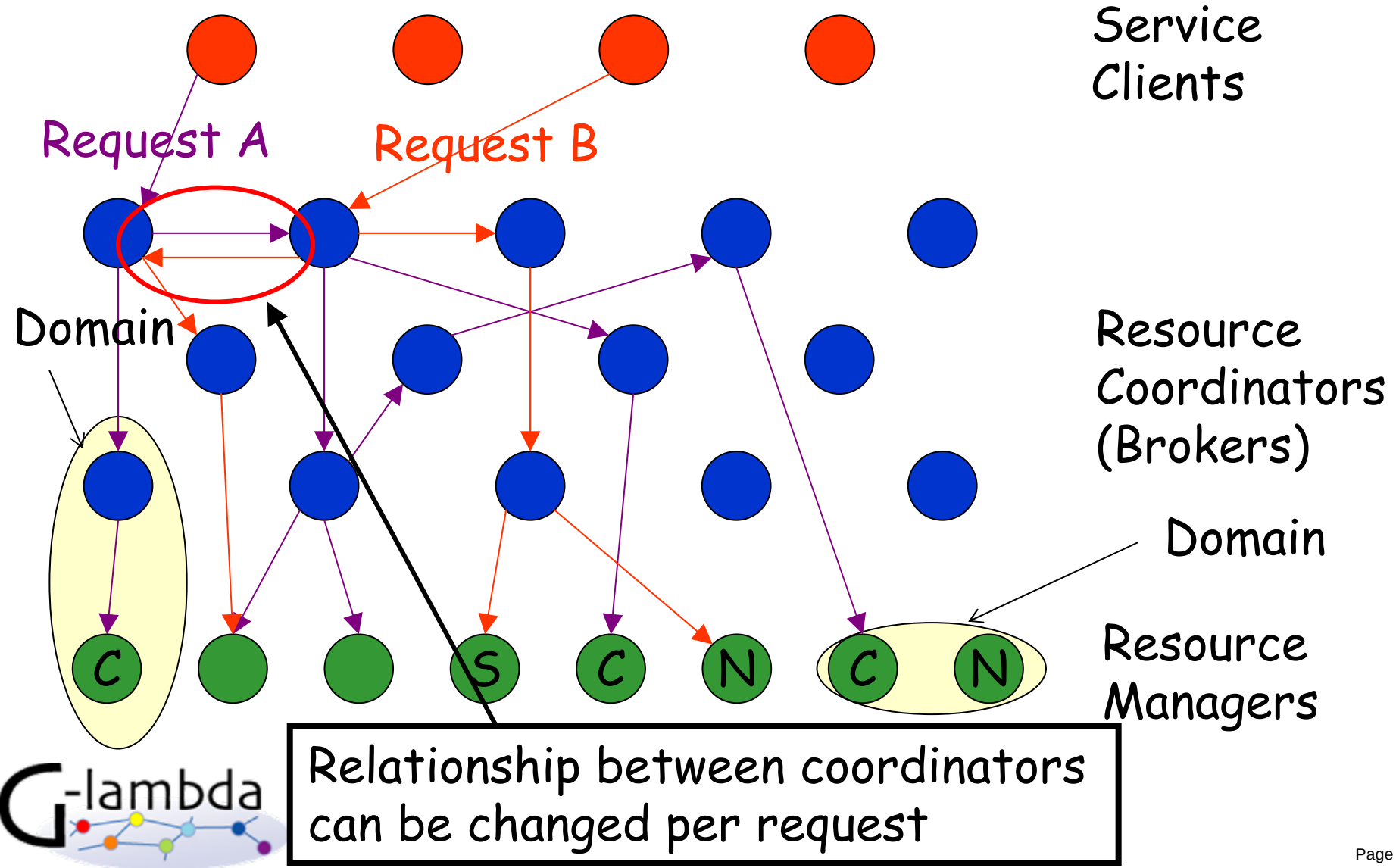
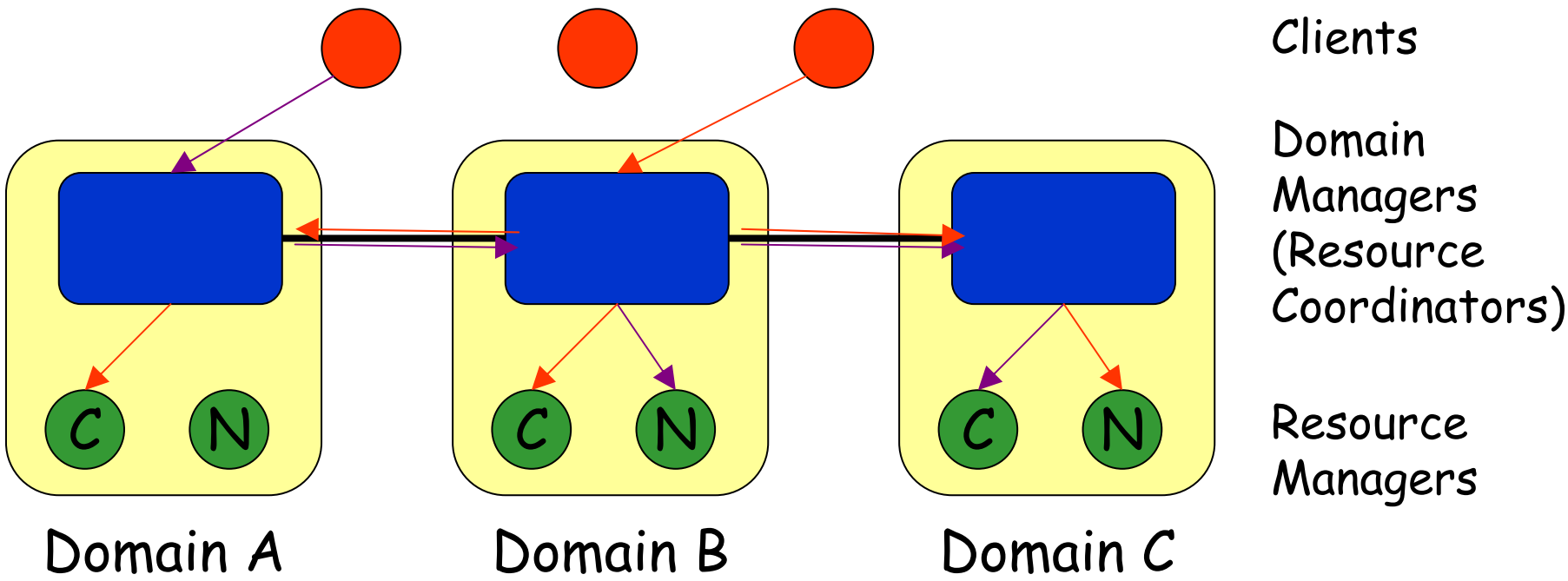
CRM
CRM: Compute Resource Manager
NRM: Network Resource Manager

Per-request hierarchical (tree) model



Comparison with Chain-model

- Chain model assumes flat relationship among domains
  - Cannot support layered relationship among components
  - Seems not general enough to coordinate many kinds of services
- Per-request hierarchical model can support Chain-model



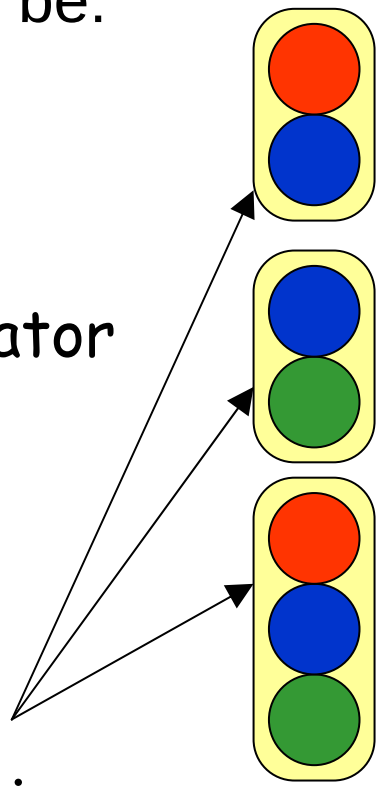
Combined components (domains)

- A component (domain) can have one or some of client, coordinator and resource manager functions. Possible combinations would be:

Service Client

Resource Coordinator (Broker)

Resource Manger



One component is both Client and Coordinator

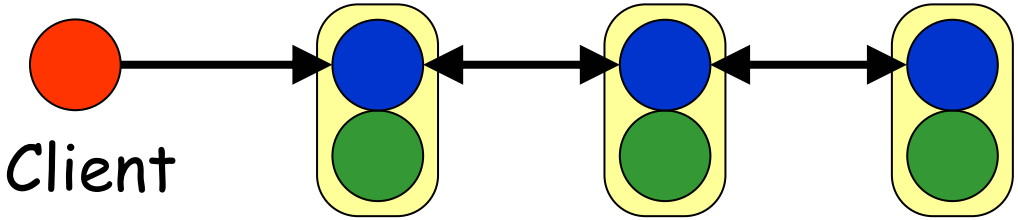
One component is both Coordinator and Manager

One component is Client, Coordinator and Manager

Domains

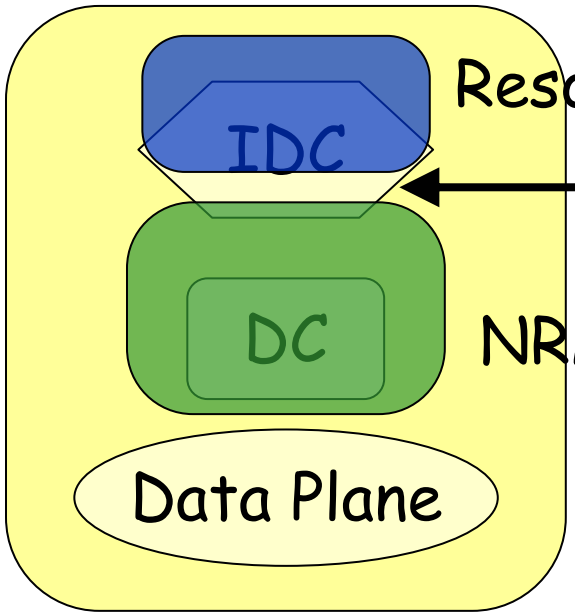
Inside a domain, a proprietary interface can be used

DICE IDC/DC may be considered as….



Resource Coordinator (Broker)

Network Resource Manger



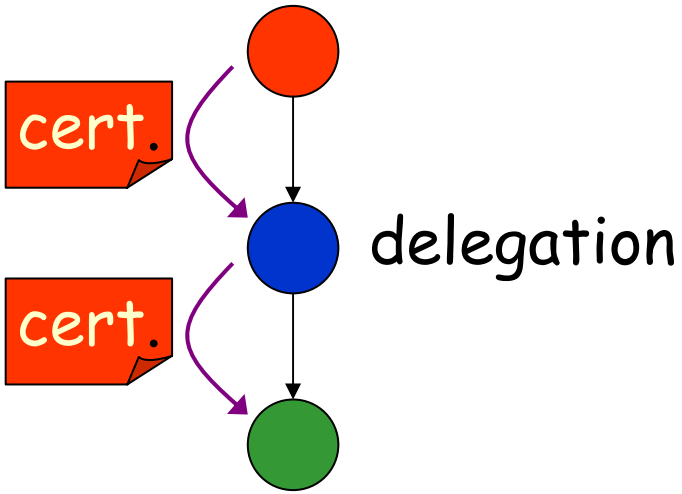
Resource Coordinator (Broker)

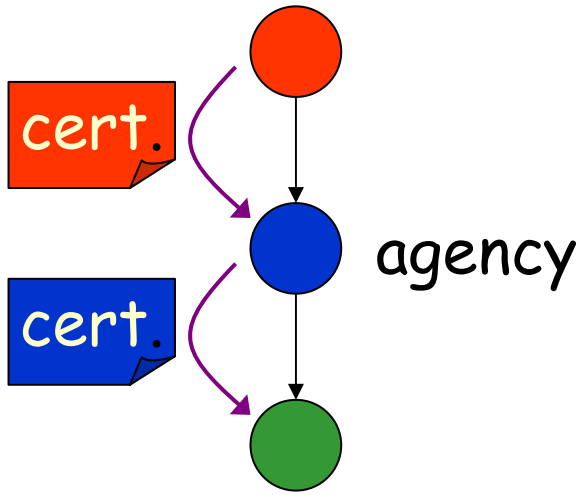
NRM (does not accept request from outside (by policy))

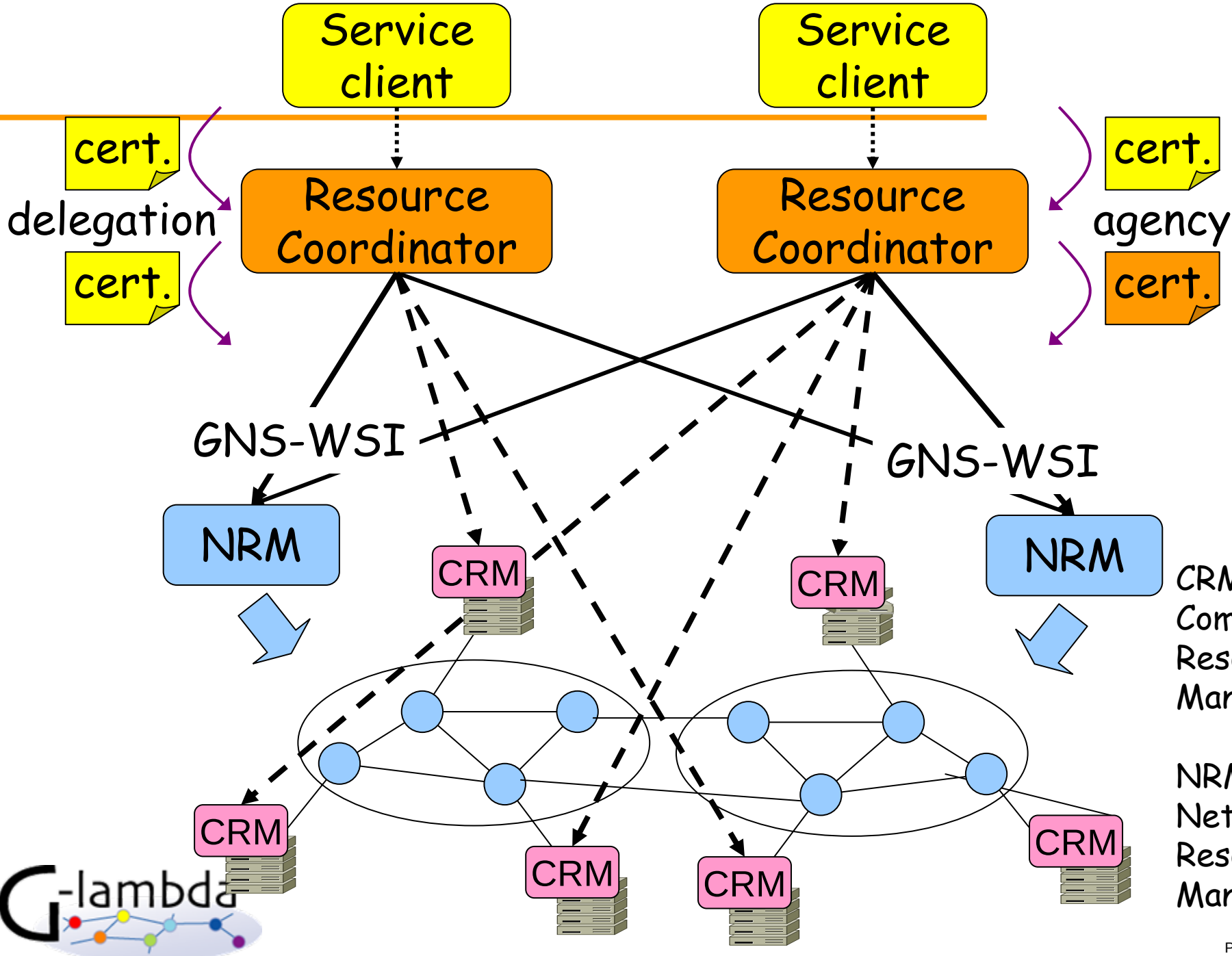
Inside a domain, a proprietary interface can be used

Authentication policy: delegation and agency

- A component can either delegate the authentication certificate it receives from a client (using GSI), or use its own certificate
  - Delegation: Resources are used in the name of the client
  - Agency: Resources are used in the name of the coordinator



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CRM: Compute Resource Manager
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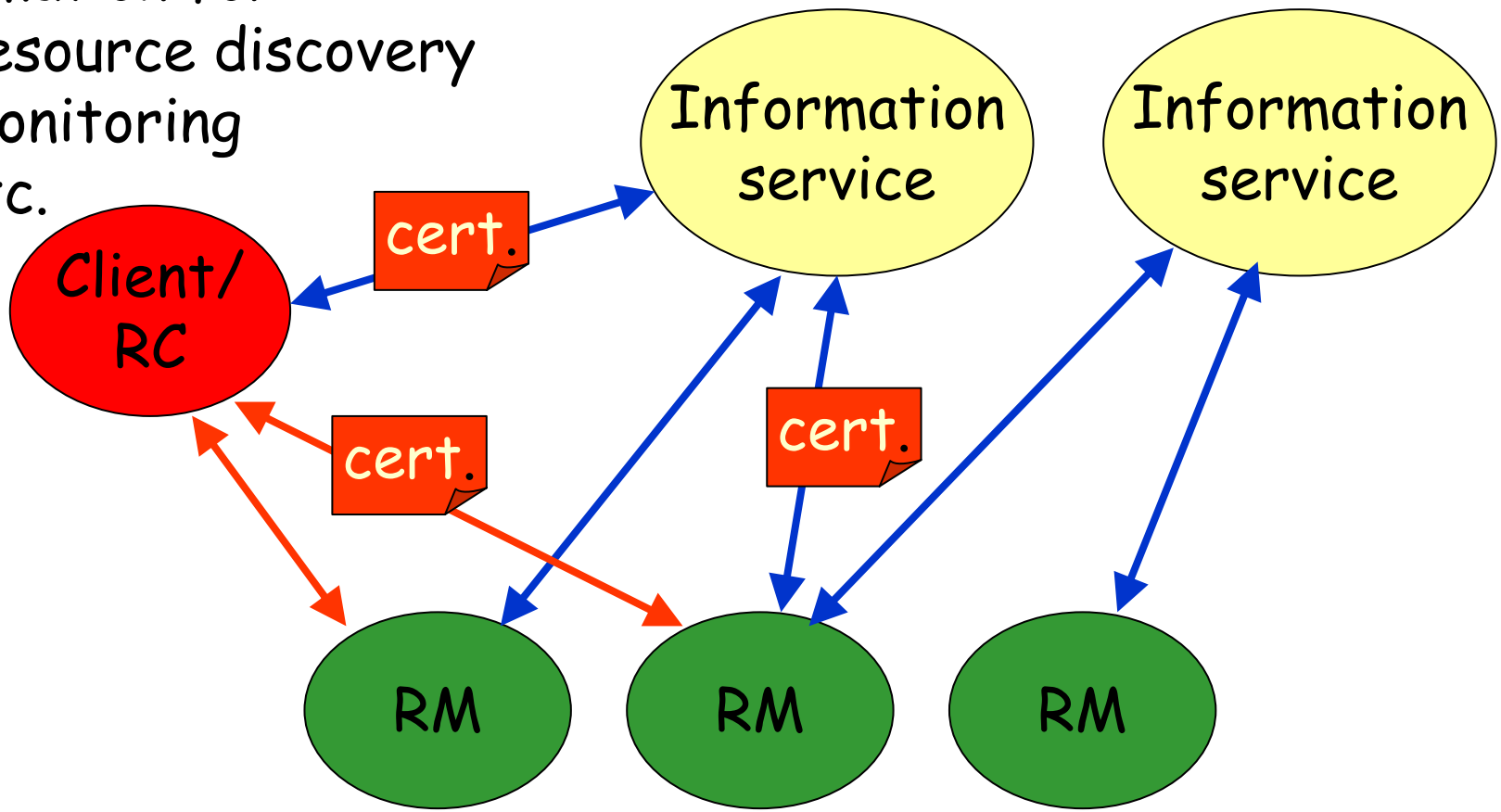
G-lambda

Policy-based information service

- **Information service is required to find resources, get availability and attributes**
  - **Each domain advertises its information**
- **Policy based information service**
  - **Information is provided to requesters based on policy**
    - **Depending on the contract with requesters, the information provided to each requester may be different.**
  - **Availability of all the resources may not be disclosed to some requesters**
  - **The topology inside a domain may not be disclosed to some requesters**
    - **Network operators may be not willing to disclose such information to general users**
  - **Status of reserved resources may be disclosed only to the requester who made the reservation**
  - **We are implementing a policy based IS using XACML**

G-lambda information service model

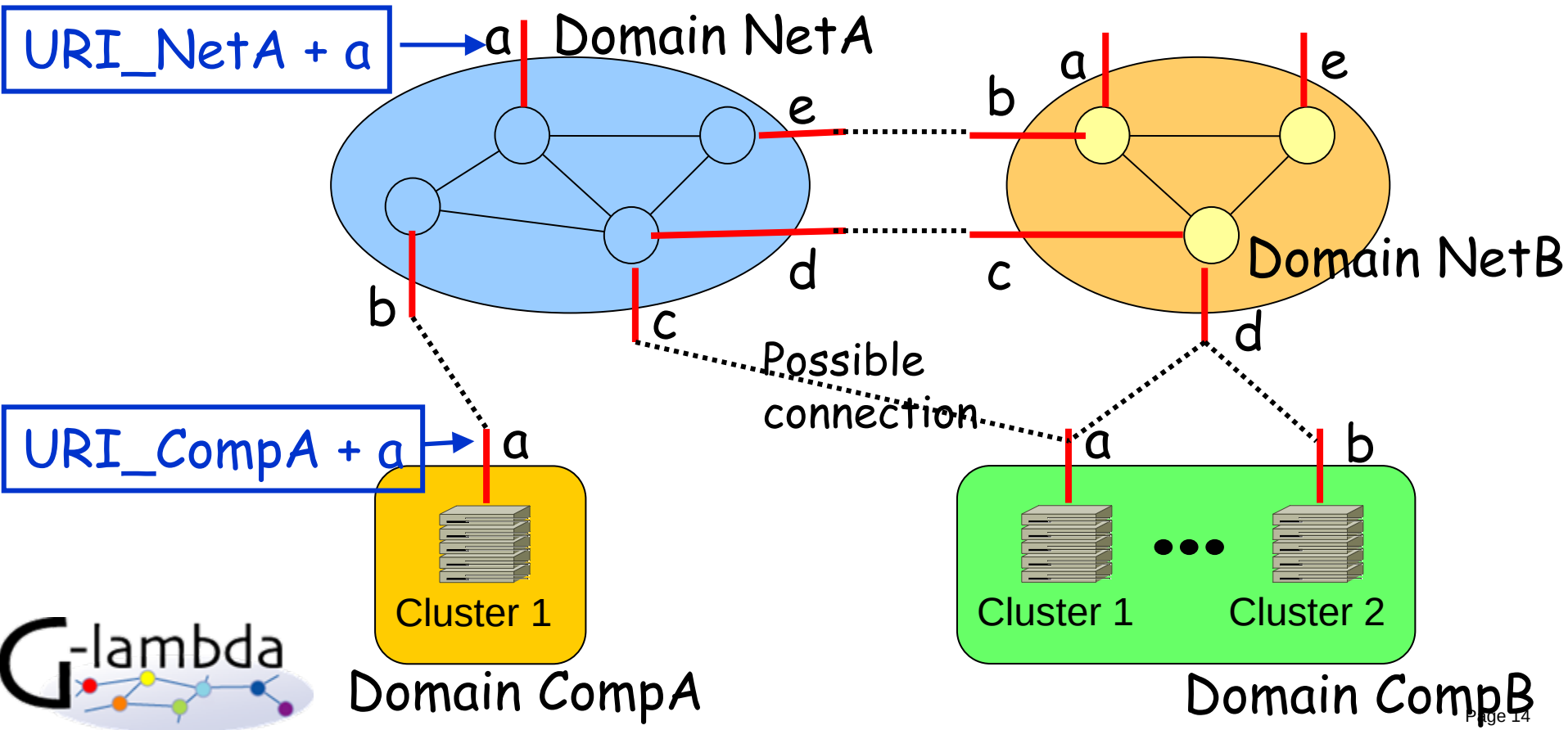
Information for
- Resource discovery
- Monitoring
- etc.



Resource managers provide their information directly to a client or via IS according to their own policy.

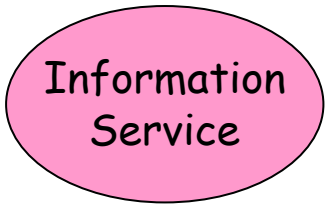
Naming scheme of end points

- Each domain has its own URI (Unique Resource Identifier)
- End point id: domain URI + id (which is unique in the domain)

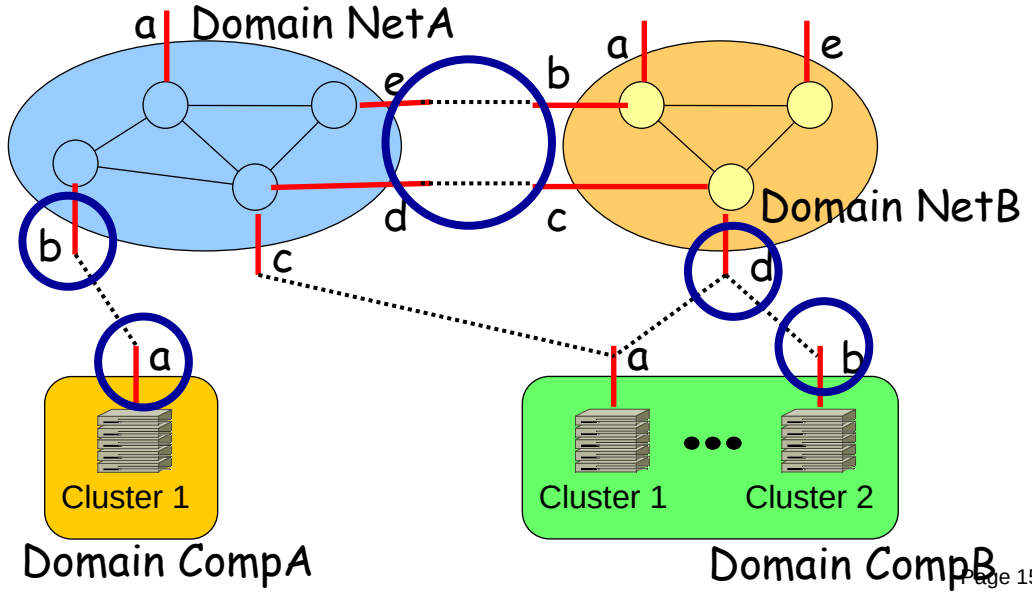


Finding a path

- Lookup domains which have required resources by accessing Information Service (directory)
- Query to CompA:
  - End point name of available resource : URI_CompA + a
  - Attribute of URI_CompA + a: media type, bandwidth, possible paring counterpart (URI_NetA + b)
- Query to CompB
  - End point name: URI_CompB + b
  - Attribute including counterpart (URI_NetB + d)
- Query to NetA and NetB
  - Possible pairs of endpoints to connect (URL_NetA + b) and (URL_NetB + b)



Directory of Domains



Reservation id and an inter-domain path

- Reservation id represents a path
  - Reservation id: (URI of the domain) + (id unique in the domain)
- Each intra-domain path has its own id, and ids are hierarchical