Proposed
Local Replica Catalog
Grid Services Specification

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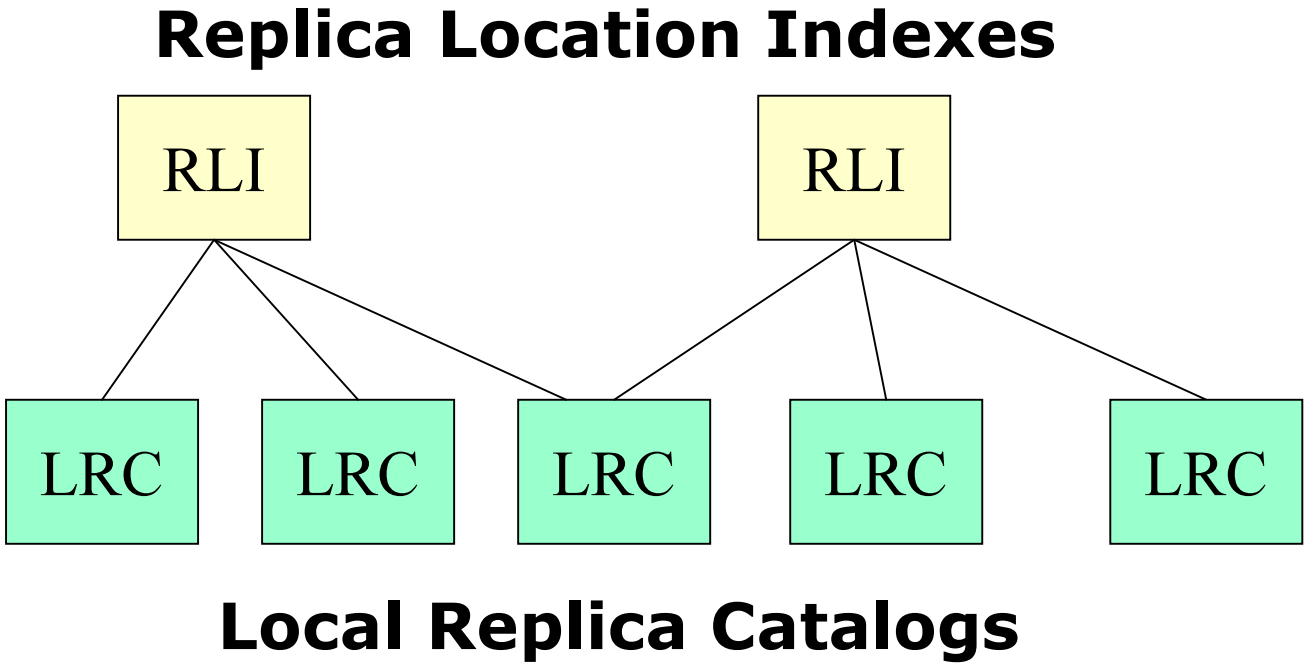
Replica Location Service



- LRCs contain consistent information about logical-to-physical mappings on a site or storage system
- RLIs nodes aggregate information about LRCs

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Converting the RLS to a Grid Service

- Actually two grid services:
  - Local Replica Catalog Service
  - Replica Location Index Service
- Develop standards in context of OGSI Replication Services Working Group
- Initially, focus on Local Replica Catalog Service

Data Replication Services Working Group Proposed Charter

- The OGSI Data Replication Services Working Group (OREP) is intended to create, review and refine grid service specifications for data replication services. These specifications will conform to the Grid Services Specification being developed by the OGSI Grid Service Infrastructure Working Group.
- Initially, the working group will focus on a specification for Replica Location Services, which maintain and provide information about data location.

Proposed Timeline for LRC Grid Service Specification

- GGF6 (October 2002): Introduce draft of OGSI LRC Grid Service Specification
- GGF7 (March 2003): Review draft LRC GS specification
- GGF8 (June 2003): Complete LRC GS Specification

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Functions of LRC

- Manipulations (creates, deletes) of logical-name-to-target-name mappings
- Manipulations of user-defined attributes on logical or target names
- Query on mappings or attributes
- Provide soft state updates to subscribing services (e.g., RLI)

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Specifying a Grid Service

- Specify Service Data Descriptions
  - Metadata about the LRC service
  - Dynamic data about the state of the service
  - Can use PortType methods to query or subscribe to service data
- Specify PortTypes
  - Collections of methods: operations and messages
- Bindings
  - Specify how the operations and messages previously defined will be transmitted.

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LRC Use of Standard Grid Service PortTypes

- NotificationSource PortType
  - Implements Subscribe method
  - Allows clients to subscribe to receive notifications of changes in service data state
- GridService PortType
  - Implements FindServiceData method
  - Allows querying service data

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LRC Grid Services PortTypes

- ServiceAdministration PortType
  - For configuring the LRC service
  - E.g., adding or deleting user-defined attributes
- MappingsAdministration PortType
  - For creating, deleting mappings and user-defined attributes
- QueryMappings PortType
  - For name-based and attribute-based queries of LRC mappings

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Subscribing to Soft State Updates

- Via the NotificationSource PortType ***subscribe*** method
- Subscribe to be notified of changes in service data elements
- Define two types of service data for soft state updates
  - List of logical names
  - Bloom filter summary of LRC state
- A service (or an adminstrator) can subscribe itself (or another service) to soft state updates
- Subscription type: use immediate mode or not

Example Service Data Description: List of Registered Logical Names

```
<gsdl:serviceDataDescription
   name="logicalNames"
   type="xsd:anyURI"
   minOccurs="0"
   maxOccurs="unbounded"
   mutability="mutable">
    <wsdl:documentation>
   logicalNames is the list of logical names registered
   in the LRC.  Each logical name is a URI.
    </wsdl:documentation>
</gsdl:serviceDataDescription
```

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Managing RLS Membership

- A distributed Replica Location Service consists of a number of LRC and RLI services
- The RLS may respond to changes in membership
  - When LRCs and RLIs join the distributed RLS
  - When LRCs or RLIs fail
- Membership management issues related to LRC:
  - Mechanism for initiating and configuring subscriptions to LRC soft state updates
  - Deal with changes to subscription characteristics
  - React to subscriber failures

Simplest Approach to Membership Management

- Use the NotificationSource PortType and its ***subscribe*** method
- Another service (or an administrator) subscribes itself (or another service) to LRC soft state service data elements
- A subscription request causes the creation of a subscription service instance, which can be used by clients to manage the subscription lifetime
- The LRC service continues to send soft state updates to the subscriber until the subscription lifetime expires

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Other Approaches to Membership Management

- Allow a service (such as an RLI) to subscribe to notifications of LRC locator information.
  - Locator state informs the subscriber that the LRC service exists
  - By sending locator information to a subscriber, the LRC effectively invites that service to initiate a separate subscription to its soft state update service data elements.
- Most general: construct external registry service that maintains information about participating LRC and RLI services
  - May react to changes in RLS membership by redistributing subscriptions to LRC state among participating RLIs

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Summary

- Converting existing RLS to two grid services: LRC and RLI services
- Plan to standardize within proposed OGSI Data Replication Services Working Group
- LRC PortTypes: serviceAdministration, mappingAdministration, queryMappings
- Specified standard PortTypes we will implement:
  - NotificationSource and GridServices
  - For subscription and query of service data elements
    - > Soft state updates
    - > Used for simple membership management