Multi-Server Based Data Management For Resource Namespace Service

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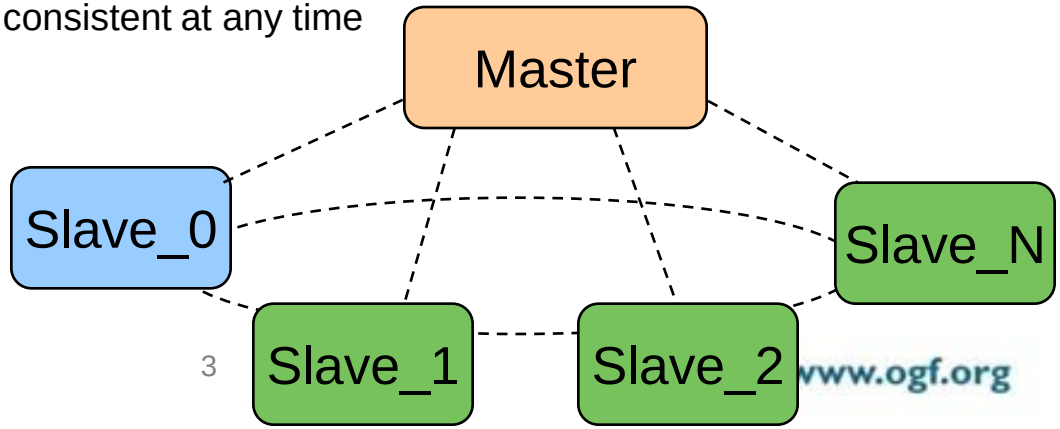
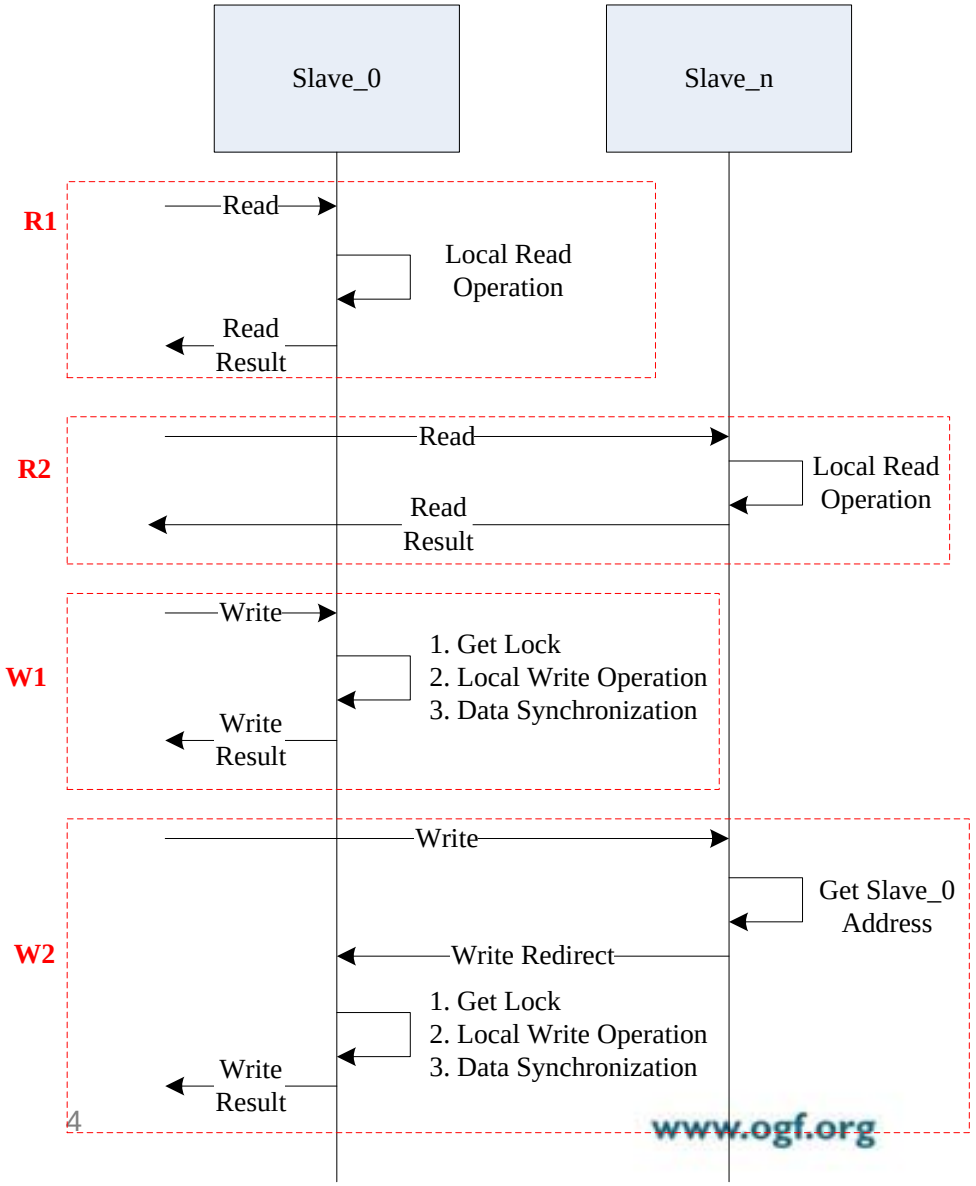
Overview

- Why we need a multi-server based data management for RNS
  - **Scalability**
    - RNS is a critical service in grid and distributed network, almost every operation on data will access this service, single-server based system will cause bottleneck problem
  - **Availability**
    - Namespace data are stored in the dynamic nodes, especially in grid environment, where nodes can come and go easily, so the QoS of RNS can not be guaranteed
- A glance of multi-server based data management
  - Master Node (1)
    - Provide the standard port types to the RNS requester
    - No namespace data are stored in this node
    - Request dispatcher: simply redirect every request to the slave nodes
  - Slave Node (N)
    - 2 kind of slave nodes: slave_0 and slave_* (1,2,3…)
    - Slave_0: response to the **write/read request**, such as *add, update and remove* functions
    - Slave_*: response to the **read request**, such as *list and query* functions
    - Data on each slave are kept consistent at any time



Process Flow of Port Type Provided by RNS

- 4 cases
  - R1: the read request is dispatched to slave_0 node
  - R2: the read request is dispatched to slave_* node
  - W1: the write request is dispatched to slave_0 node
  - W2: the write request is dispatched to slave_*



Join of a new node

- Master assigns a name/id to this new node
- Master asks one slave node to synchronize the namespace data to this newly joined node
- Master enable this node

Node Failure

- Slave_* node failure
  - Not affect the system availability, other slaves can also respond to the read request
- Slave_0 node failure
  - Choose another node to take over the failed slave_0 node
  - System availability will be affected during choosing another slave_0 node, but system will continues after that
- Master node failure
  - System will be unavailability during choosing a new master or restart the master
  - Namespace data will not lost

Conclusion

- Multi-Server based data management can improve the scalability
  - All slave nodes can respond to read request
  - Can dynamically add new slave node to improve the system performance
- Multi-Server based data management can enhance the availability
  - Master node failure will not lost the system data
  - System can also work when slave_* nodes failure
  - Slave_0 nodes failure can only cause a slight effect to the system availability

- What we are doing in CMRI
  - Developing a prototype of this multi-server based data management using open source software
    - Hadoop / Zookeeper
  - Planning to carry out an experiment on scalability and availability in typical scenarios
  - Enhance the system functions with the help of experts from OGF GFS-WG, and contribute our experiences to OGF

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