Scalable, Fault-tolerant Management in Service Oriented Architecture

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MOTIVATION

- Resources[*] **must** meet
  - General **QoS** and Life-cycle features
  - (User defined) **Application specific** criteria
  - Improper management such as wrong configuration – major cause of service downtime
- Large number of widely dispersed Resources
  - Decreasing hardware cost => Easier to replicate for fault-tolerance (Espl. Software replication)
  - Presence of firewalls may restrict direct access to resources
- Resource specific management systems have evolved independently (different platform / language / protocol)
  - Requires use of proprietary technologies
- Central management System
 - Scalability and single point of failure

SUMMARY

- A Scalable Resource Management Framework
  - Tolerant to failures in framework itself and can handle failures in managed resources via user defined policies
- Built on top of a publish subscribe framework to provide transport independent messaging between framework components
- Web Service Management for "Resource" – "Resource Manager" communication
- Detailed evaluation of the system components to show that the proposed architecture has acceptable costs (adds about 1% additional resources)

Performance Benchmarks
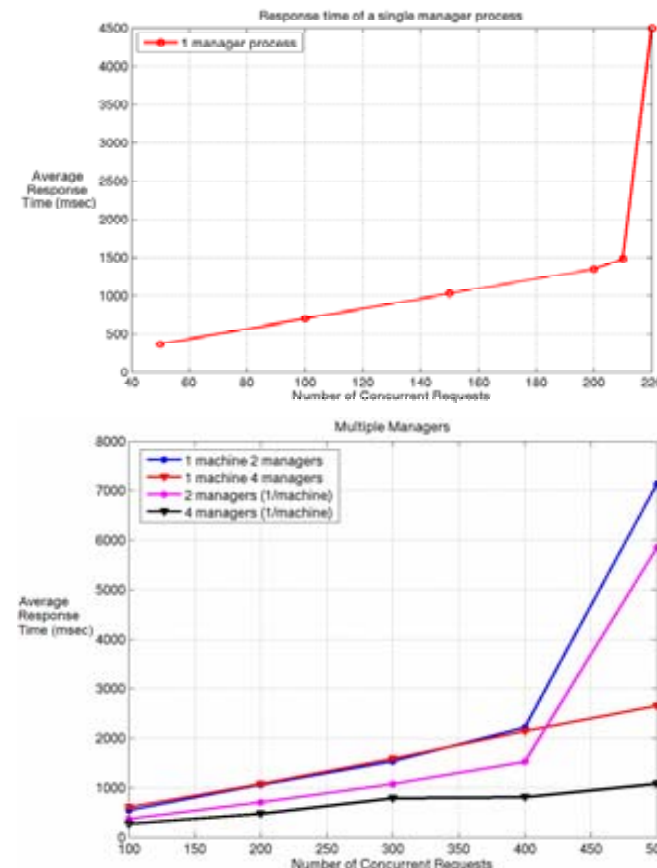
USER COMPONENT (Management Console)
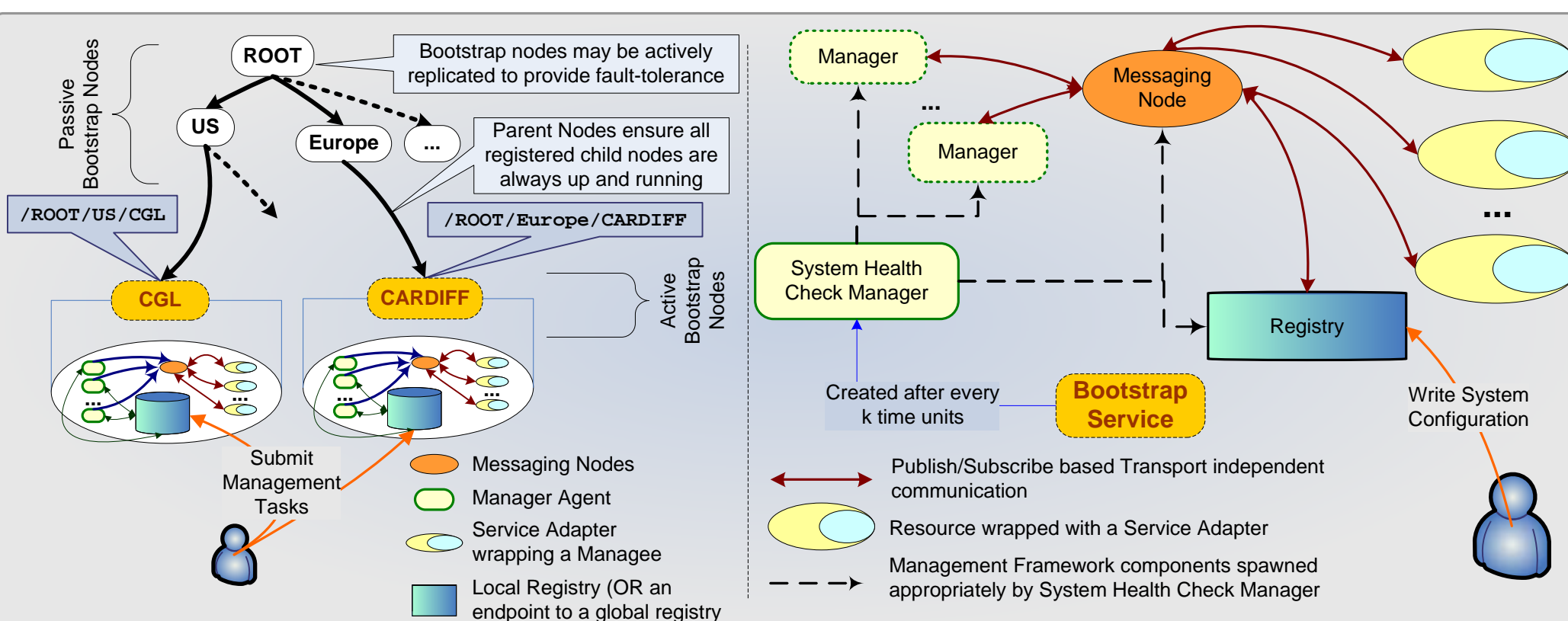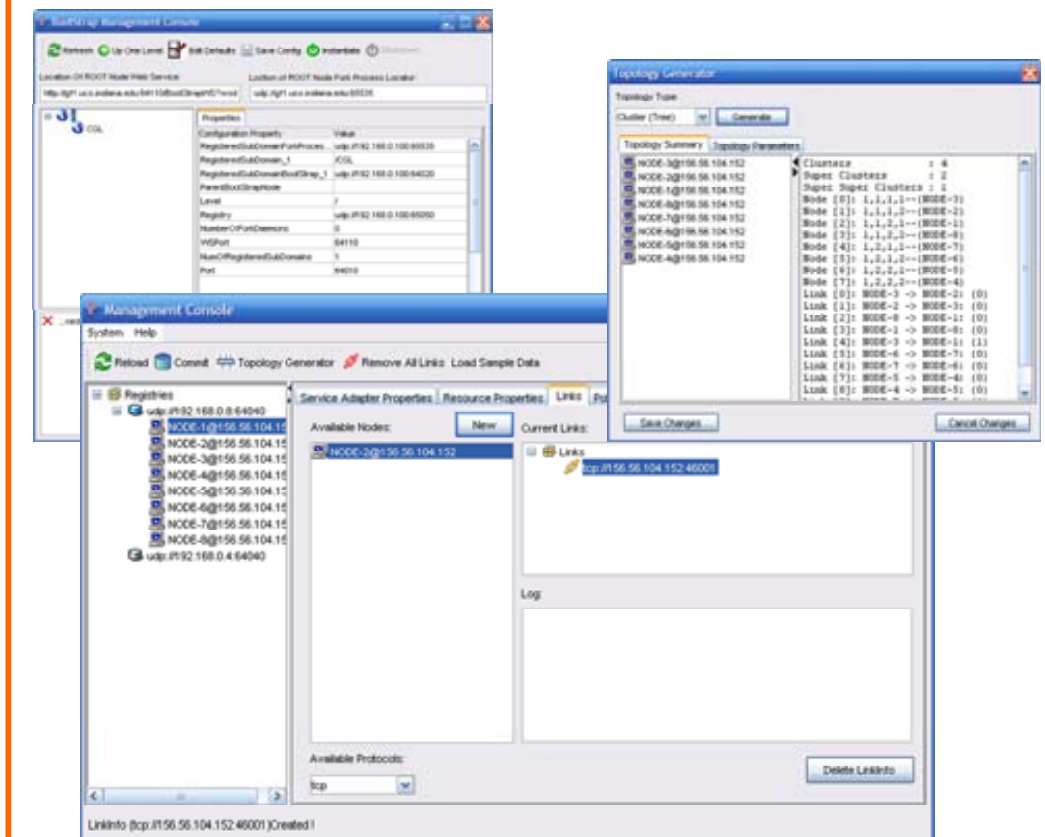
MORE INFORMATION

Publications:

Managing Grid Messaging Middleware Harshawardhan Gadgil, Geoffrey Fox, Shrideep Pallickara, Marlon Pierce, In Proceedings of "Challenges of Large Applications in Distributed Environments" (CLADE), pp. 83 - 91, June 19, 2006, Paris, France

Scalable, Fault-tolerant Management in a Service Oriented Architecture Harshawardhan Gadgil, Geoffrey C. Fox, Shrideep Pallickara, Marlon Pierce, As poster In Proceedings of the 16th IEEE International Symposium on High-Performance Distributed Computing HPDC 2007 Conference, Monterey Bay, CA, June 27 - 29, 2007

Scalable, Fault-tolerant Management of Grid Services: Application to Messaging Middleware Harshawardhan Gadgil, PhD Thesis, Indiana University, Apr 2007

Software:

Released with Naradabrokering (**http://www.naradabrokering.org**) in Feb 2007

Currently being used as a Grid Builder tool to deploy grids dynamically and remotely (Courtesy: Rui Wang, Anabas.com)

Full Paper:

http://grids.ucs.indiana.edu/ptliupages/publications/ mgmtArchitecturePaper-hpdc.pdf

Legend:
- Messaging Nodes
- Manager Agent
- Service Adapter wrapping a Managee
- Local Registry (OR an endpoint to a global registry)
- Publish/Subscribe based Transport independent communication
- Resource wrapped with a Service Adapter
- Management Framework components spawned appropriately by System Health Check Manager

*Resource: An entity that can be initialized and controlled by modest external state but may initialize and control services which may require much higher state