SLA-based QoS Framework for Federated Autonomic Computing

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Dissertation Description

- Existing federating computing architectures (FCA) don't allow to utilize efficiently Quality of Service (QoS) to assure best computing performance with best allocation of resources at the best peformance/cost ratio
- Service requestors do not usually have a common understanding about service providers, priorities, responsibilities, guarantees and warranties for required Service Level Agreement (SLA)
- Current service provisioning solutions are static - there is a need for autonomic provisioning integrated with QoS/SLA management
- Current solutions propose service provisioning to allow better resource allocation, however, in this case neither the service requestor or the provider have control over which resources will be allocated to perform a specific computing task – no QoS associated with tasks
- Without sufficient QoS management techniques resource owners are unable to share their resources efficiently with provisioning agents or requestors
- Federated computing can not utilize efficiently availble resources with requestor QoS and associated time/cost optimization

Conclusion

The ability to control and manage provisiong agent and requestor QoS has become a crucial challenge for FCA. An autonomic resource management framework for FCA, which allows to specify and manage SLA-based QoS autonomically is needed.

Objective/Approach

Objective

Create a SLA-based QoS Framework for Federated Autonomic Computing (FedComQoS)

Approach

- Review literature on relevant QoS and resource management frameworks, SLA specifications and negotiation protocols, resource allocation alogorithms, and service provisioning techniques
- Design FedComQoS components and their connections
- Develop QoS and SLA-specification protocols for resources and tasks
- Develp SLA negotiation protocol
- Develop optimization algorithms for SLA-based QoS resource allocation
- Develop autonomic provisioning for expected by requestors QoS
- Implement components and tools of the FedComQoS
- Integrate serrvice commponets in SORCER for SLA-based QoS computing
- Validate and verify the FedComQoS
- Deploy the FedComQoS in the SORCER environment

Schedule

Literature review	**Nov 2008**
FedComQoS requirements analysis – Use Cases	**Dec 2008**
UML modelling, QoS and SLA specification	**Jan 2008**
Resource allocation and optimization algorithms	**Feb 2009**
PoC implementation of FedComQoS components	**March-April '09**
Validation and verification of the FedComQoS	**May 2009**
Deployment of the FedComQoS in SORCER	**June 2009**

Benefits

- Better resource allocation - allows to achieve best performance or lowest cost of requestor inquiries–time/cost optimization
- Flexibility in assigning QoS to requestor inquires and provisioned services
- Accounting for flexible resource utilization based on dynamic cost metrics
- Efficient QoS-based metaprogramming – matching and if needed autonomic service provisioning
- Flexible and extesible negotiation and management of leased SLA agreements for related QoS parameters
- User friendly and zero-install Service-UIs for configuration, monitoring, and administration of FedComQoS infrustructure services