Mapping Service Oriented Architecture to Grid Infrastructure

Eric Oppong and Souheil Khaddaj
Outline

- SOA: What it Means
- SOA services
- SOA Technology and Applications
- The Grid
- QoS:
  - SOA perspective
  - Grid Perspective
  - Mapping Model
  - Conclusion and Future Works
A Service Oriented Architecture (SOA) is a form of distributed systems architecture.

- [W3C – Web Service Architecture]

**service-oriented architecture (SOA)** is a flexible set of **design** principles used during the phases of **systems development and integration**. SOA–based architecture provide a loosely–integrated suite of **services** that can be used within multiple business domains.

- [Wikipedia]

.....essentially a collection of **Services** communicating with each other. The communication can involve either simple data passing or it could involve two or more services coordinating some activity. Some means of connecting services to each other is needed.

......new thing, evolved from past developments; DCOM or Object Request Brokers (ORBs) based on the CORBA specification.

- [Douglas K. Barry]

Service–Oriented Architecture (SOA) is an **architectural style** that supports **Service orientation**

- [Open Group, working group on SOA ]
SOA: Service

- Services makes up SOA
  - Service Characteristics
    - Loosely coupled
    - Ability connect and communicate with other services
    - Self contained
    - Independent
    - Abstract from consumers
    - Scalable
    - Well defined standard (open standard technology)

SOA is a collection of independent loosely coupled applications that are capable to communicate in the form of provision of service (e.g. data transmission) by connecting with other applications or initiation the connection and communication between other applications. Services in SOA conform to a standard format to enable easy accessibility and communication and independent of the underlying development technology.
Internet allows the rapid deployment of applications over multiple platforms

Web Service technology over the Internet locally within organisation (intranet) or public domain.

Service are published and discovered using Universal Description Discovery and Integration (UDDI)
SOA Technology and Applications

Provider

UDDI/WSDL

Register and publish service

Service Lookup

Retrieve service

Request Service

Web Service

Client

5/5/2011
The Grid

- Collection of Cluster computers
- Loosely coupled and heterogeneous systems
- Middleware (software) manages allocation of process and resources

-..is the combination of computer resources from multiple administrative domains applied to a common task [Wikipedia – 15/01/2010]

5/5/2011
The Grid

Grid Setup: multiple grids in virtual Organisation

High performance Data centre (N)

Computational Grid (M)

participants N access CPU A

participants N can access data in C

participants M access CPU B

participants M can access data in C
Quality of Service

- Reusability
- Scalability
- Interoperability
- Performance
- Reliability
- Robustness
- Availability
QoS: SOA perspective

Achieving High Performance SOA Application

- Scalability
  - Service Management
    - No. Of Rejected Packets
  - Service Communication
    - No. Of Services
- Interoperability
  - Service Independence
  - Compatibility
- Re-Usability
  - Modularity
    - Coupling Factor
  - Complexity
    - Number of services (size)
QoS: Grid Perspective

Achieving High Performance Grid Service

Performance
- Latency
  - Response Time
- Throughput
  - Data Exchange
- Resource utilization
  - Memory and CPU Usage

Scalability
- Network Communication
- Resource Management
  - Number of Nodes
Analysing QoS Factors – Pair Comparison

SOA Factors

Grid Factors

QoS Factors for SOA application

Qos Factors for Grid Service

5/5/2011
SOA environment pair compare chart – AHP Analysis
Grid environment pair compare chart – AHP Analysis

- Latency (L)
- Throughput (T)
- Resource Utilisation (RU)
- Network Communication (NC)
- Resource Management (RM)
Mapping Model

Service Provider

Service Allocation

Service List

QoS Requirement

Processor

History data

Resource Manager

Resource analyser

Resource List

QoS Provision Processor

Grid Resources

R1

R2

R3

. .

Rn

Application Developer

Service Compositio

ni
Conclusion

- Overview Of SOA
- Overview Of Grid Computing
- AHP Analysis of SOA and Grid QoS
- GESOA Mapping Model

- Detailed design of the model together with its implementation and evaluation will be considered in future works
Thank You...

Questions?

Answers to all questions will be in future works 😊