

# Service Oriented Architecture (SOA)

Chapter 17  
Of The Grid 2 by  
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1

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## Introduction

- Service is an entity that provides some capability to its clients by exchanging messages. Operations are defined in terms of message exchanges.
- A service oriented architecture (SOA) is one in which all entities are services and any operation visible to the architecture is the result of message exchange.
- We will look into architecture and operation of SOA.

2

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## Examples of Services

- Storage service
- Data transfer
- Troubleshooting service
- Common theme is monitoring service, storage services and query services.

3

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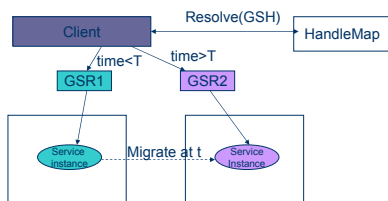
## Virtualization

- Encapsulating service operations behind a common message-oriented service interface is called service virtualization.
- Isolates users from details of service implementation and location.
- Assumes support of a standard architecture.
- Webservices (WS) can do this, however grid life cycle management, fault handling and other features we have seen in the GT3 tutorial are not available with WS.
- OGSi specification addresses these issues using a core set of standard services.

4

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## GSH, GSR and HandleMap



5

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## Service Group

- A service group is a Grid Service that maintains information about a group of grid service instances.
- Any arbitrary collection of service instance can be grouped this way.
- Service group may be used to keep track of services in a virtual hosting environment or a VO.

6

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## OGSA Services

- Core services
- Data and information services:
  - Data naming and access: access and federate diverse sources
  - Replication
  - Metadata and provenance: describing and tracking how data are created and recreating steps required to regenerate data on demand.

7

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## OGSA Services (contd.)

- Management of services
  - Provisioning and resource management: required for negotiating service-level agreement (SLA) between consumers and providers, dynamic reallocation and distribution policy consistent with SLA.
  - Service orchestration: managing the choreography of interacting services.
  - Transactions
  - Administration: change management, identity management for deployment etc.

8

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## Case Study: Storage Provider Service

- Multiple storage services implement a standard storage service interface (portType in WSDL).
- One or more service offer operations to perform transfers from one storage service to another.
- Various other services provide support functions: monitoring, discovery, brokering and troubleshooting.
- Many clients access these services.

9

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## Storage Service Design

- First level: VO, Service group and the service factories
- Storage service: two factories, one for regular storage, and another for reliable storage; for managing disk space and individual transfers.
- Reliable transfer service factory for creating file transfer service
- Storage broker service: factory for service managing end-to-end service quality
- Monitoring service: for creation of monitoring and notification service for individual transfer
- See figure 17.10

10

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## Steps Involved

- Negotiate an SLA with storage system. Figure 17.11: involves storage reservation
- Establish delivery service to effect data transfer. Figure 17.12: involves TransferEndpoints
- Monitor transfer. Figure 17.13: TaskMonitor, DataTransfer
- Lets discuss these in detail.

11

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## Future Directions

- Tools: new tools are needed to facilitate integration of grids into different application environment
- Implementation: Lightweight implementations and effective sandboxing
- Semantics: development of mechanisms for analyzing and reasoning about the behavior of service compositions.
- Scalability: Need technologies that can scale to increasingly complex communities and interactions including service economies.

12

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