

Grid Computing

Web Services Resource Framework WSRF

Paul A. Farrell
Fall 2006

The Grid: Core Technologies
Maozhen Li, Mark Baker
John Wiley & Sons; 2005, ISBN 0-470-09417-6

Paul A. Farrell 2006 KENT STATE Grid Computing 1

WSRF

- Introduces WS-Resource to model and manage state information
- WS-Resource: A stateful resource
- WS-ResourceLifetime
 - defines mechanisms for service requestors to request Web services to destroy associated WS-Resources (immediately or after certain time), and also WS-Resource ability to self-destruct action after a period of time
- WS-ResourceProperties
 - defines how properties of a WS-Resource may be declared as part of a Web service interface
 - also defines a set of message exchanges to query or update the property values of the WS-Resource

Paul A. Farrell 2006 KENT STATE Grid Computing 2

WSRF

- WS-Notification
 - defines mechanisms for event subscription and notification using a topic-based publish/subscribe pattern including
 - Standard message exchanges to be implemented by service providers that wish to participate in notifications.
 - Standard message exchanges for a notification broker service provider. The interface (*NotificationBroker*) defines message exchanges to describe a message broker
 - Operational requirements for service providers and requestors and an XML model that describes topics.

Paul A. Farrell 2006 KENT STATE Grid Computing 3

WSRF

- WS-Notification - Three specific specifications
 - WS-BaseNotification
 - defines the interfaces for NotificationProducers and NotificationConsumers to exchange messages
 - WS-BrokeredNotification
 - defines interfaces for NotificationBrokers, which play roles of both NotificationProducers and NotificationConsumers i.e can deliver notification messages to NotificationConsumers and subscribe to notifications distributed by NotificationProducers.
 - WS-Topics
 - mechanism to organize and categorize items of interest for subscription
 - defines three topic expression dialects and specifies an XML model for describing metadata associated with topics

Paul A. Farrell 2006 KENT STATE Grid Computing 4

WSRF

- WS-BaseFaults
 - defines an XML Schema for base faults aimed at standardizing the terminology, concepts, XML types, and WSDL usage of a base fault type for Web services interfaces
- WS-ServiceGroup
 - primitives for managing collections of services e.g. registries and index services
 - defines a means by which Web services and WS-Resources can be aggregated or grouped together
 - ServiceGroup membership rules, membership constraints and classifications are expressed using the resource property model as defined in the WS-ResourceProperties specification
- WS-RenewableReferences
 - renew endpoint references when the current reference becomes invalid. Replaces the concepts of GSH and GSR in OGSF

Paul A. Farrell 2006 KENT STATE Grid Computing 5

WS-Resource

- A Web service, which can be viewed as a stateless message processor, can be associated with stateful resources (WS-Resource) having the following:
 - It is a stateful resource that can be used as a data context for a Web service to exchange messages.
 - It can be created, identified, and destroyed.
 - A stateful WS-Resource type can be associated with a Web service interface definition
 - to allow well-formed queries against the WS-Resource via its service interface
 - the status of the stateful WS-Resource can be queried and modified via service message exchanges

Paul A. Farrell 2006 KENT STATE Grid Computing 6

Factories and Resources

- A WS-Resource factory is any Web service capable of bringing one or more WS-Resources into existence.
- The response message of a factory typically contains at least one *Endpoint Reference* that refers to the newly created WS-Resource.

Paul A. Farrell 2006 KENT STATE Grid Computing 7

The Implied WS-Resource Pattern

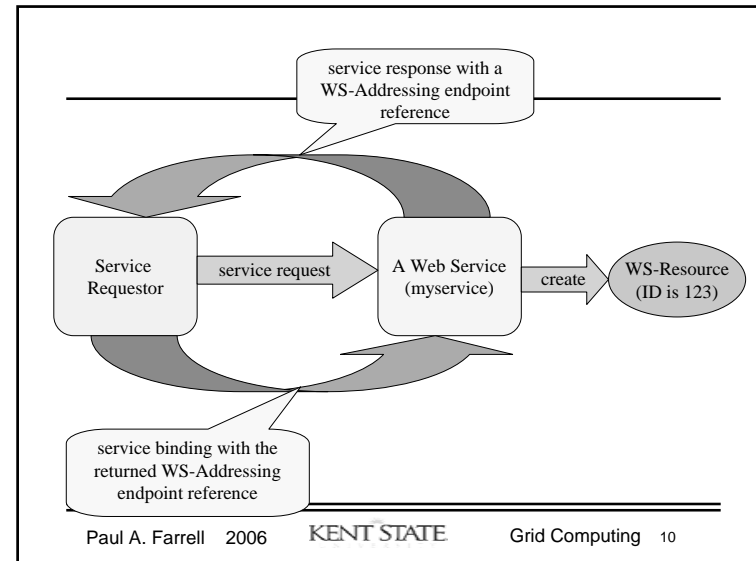
- The term *implied WS-Resource pattern* is used to describe a specific kind of relationship between a Web service and one or more stateful WS-Resources
 - *implied* means that when a client accesses a Web service, the Web service will return a WS-Addressing endpoint
 - IDs of the WS-Resources are automatically encapsulated in the endpoint reference and returned to the client
 - ID is only used by a Web service to locate a specific WS-Resource
 - *pattern* indicates relationship between Web services and stateful WS-Resources codified by existing Web services technologies, in particular XML, WSDL, and WS-Addressing

Paul A. Farrell 2006 KENT STATE Grid Computing 8

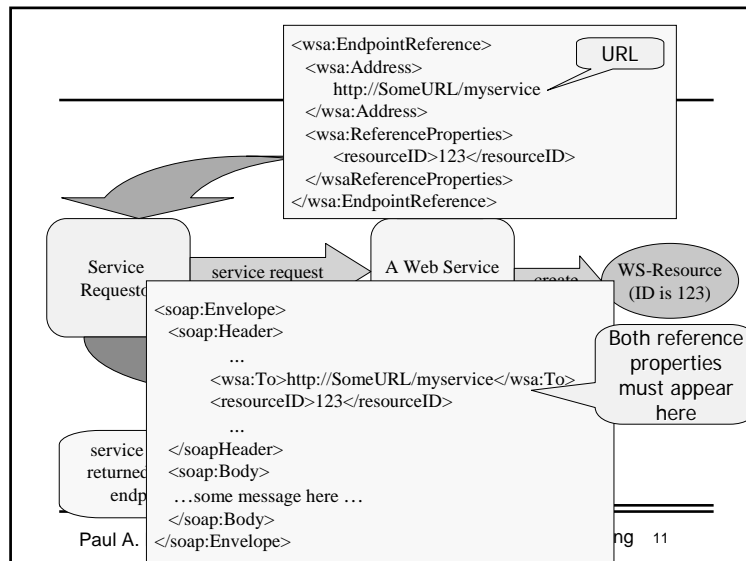
WS-Addressing and Endpoint References

- The concept of *endpoint references* is the core of the WS-Addressing specification
 - endpoint references*: XML serialization of a network-wide pointer to a Web service contains
 - network transport-specific address of the Web service, e.g., URL if protocol is HTTP
 - reference properties containing ID to uniquely identify a WS-Resource

Paul A. Farrell 2006 KENT STATE Grid Computing 9



Paul A. Farrell 2006 KENT STATE Grid Computing 10

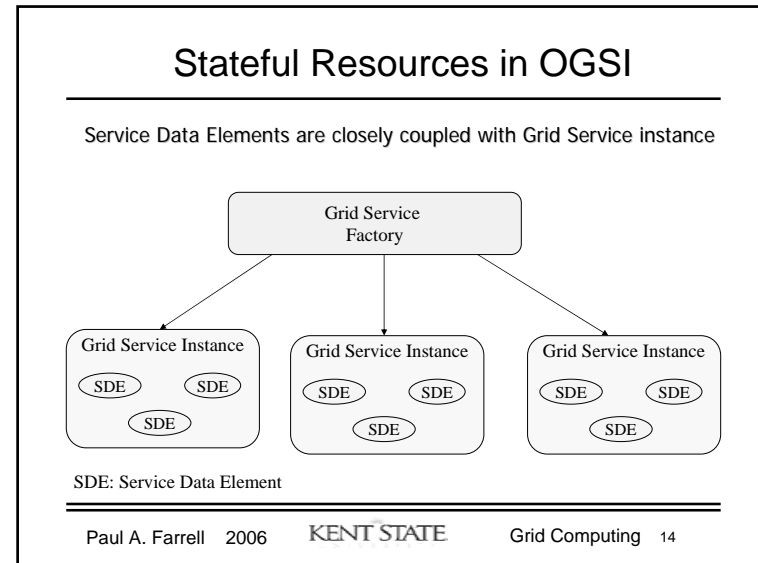
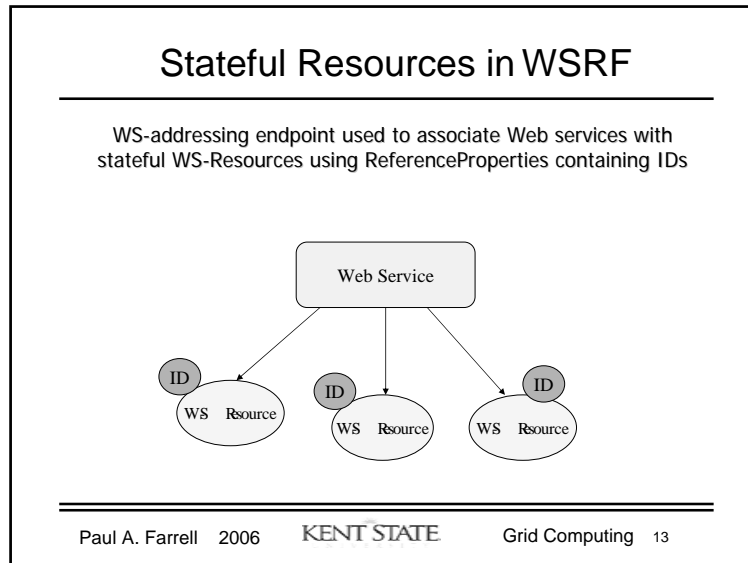


Paul A. Farrell 2006 KENT STATE Grid Computing 11

WSRF and OGSi

- WSRF advantages
 - OGSI is a heavyweight specification with too much definition in one specification
 - OGSI does not work well with existing Web services tooling
 - OGSI models a stateful resource as a Web service that encapsulates the state of the resource, with the identity and lifecycle of the service and resource state coupled. WSRF makes explicit distinction between stateless Web service and the stateful resources acted upon by the service
- OGSI advantages
 - OGSI has strong notions of extensibility through inheritance
 - "OGSI-compliant Grid services" guaranteed to provide a range of portTypes and behaviour

Paul A. Farrell 2006 KENT STATE Grid Computing 12



Functionality in WSRF and OGSi

OGSi	WSRF
Grid Service Reference	WS-Addressing Endpoint Reference
Grid Service Handle	WS-RenewableReferences
Handle Resolver	WS-RenewableReferences
Service Data	WS-ResourceProperties
Grid Service Lifetime Management	WS-ResourceLifetime
Notification	WS-Notification
Factory	Implied WS-Resource Pattern
Service Group	WS-ServiceGroup
Base Fault Type	WS-BaseFaults

Paul A. Farrell 2006 KENT STATE Grid Computing 15

