



Information and Communication Systems Research Group

Mirroring Resources or Mapping Requests: implementing WS-RF for Grid workflows

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Publishing Grid Workflows as Services



- Workflows are used to model the interactions between computational and data services deployed on the Grid
- Provide Grid workflows with a standardized, stateful service-oriented interface



Mapping Processes to Grid Services

- WS-RF & WS-N group of specifications define the Grid service interface
- WS-Resource specification:
 - defines the implied resource pattern, the relationship between client, a Web service and a resource



→ A process is a stateful resource



Lifecycle Management

- Lifecycle Management:
 - WS-Lifetime: resource has a lifetime, two operations to end it
 - → Mapping implies a process instance to have a lifetime
 - → We additionally defined operations to create resource (start a process)

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Monitoring

- Monitoring:
 - WS-Properties defines resources to have properties which can be read and written
 - → All elements of the process execution state are considered to be properties that can be read and written
 - WS-Topics defines resources to provide topics to which clients can subscribe
 - → All elements of the process execution state are topics to which clients can subscribe



JOpera: Grid Workflows for Eclipse

- Generic approach applicable to many different process execution engines
- Approach is feasible: implemented WS-RF mapping for JOpera



 JOpera is a Grid workflow management system for Eclipse providing powerful design and runtime (execution & monitoring) tools for large scale process management



JOpera Architecture





Mirrored Implementation

- Mirrors state of the process instances in the execution engine
- We use WS-Core to implement the Hosting Environment layer







Initial Measurements

- Mirrored implementation: up to 100 clients create 1000 resources each
- Comparing it to the throughput of a simple Web service







Embedded Implementation

 Embeds the state of the processes in the persistent storage of the engine, all requests are translated to requests to the JOpera engine



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Comparison – Resource creation

Up to 100 clients create 1000 resources each



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Comparison – Read Property

Up to 100 clients read one property 1000 times



Conclusions

- Scientists want to reuse and share Grid workflows
- Publish Grid workflows as services on the Grid
- Scalable WS-RF implementation, optimized for publishing processes as stateful resources



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