




north-east regional e-science centre 

## NEReSC Core Grid Middleware


Experiences from Converting Web Services to Grid Services


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Overview 


- Motivation
- Building Grid Applications
- Plans/Deliverables
- myGrid Workflow Enactment Service
- myGrid Notification
- Conclusions

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Motivation 


- The centre is involved in a number of Grid-related research projects
  - GOLD, OGSA-DAI, Polar\*, BASIS, GridMIST, GridSHED, exSys, e-Demand, myGrid, Microbase, Neuroinformatics
- Issues identified
  - Commonalities in software requirements
  - Possibilities of reusing software components
  - Testing
  - User education/tutorials
- Experience required in transforming existing Web Services to Grid Services


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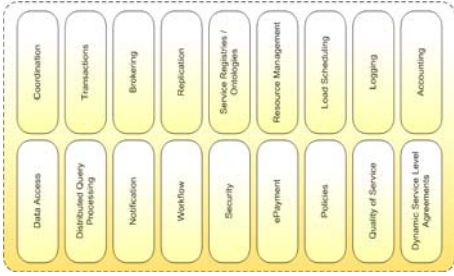
Building Grid Applications 


- Current approach by many UK e-Science projects
- The OGSA approach




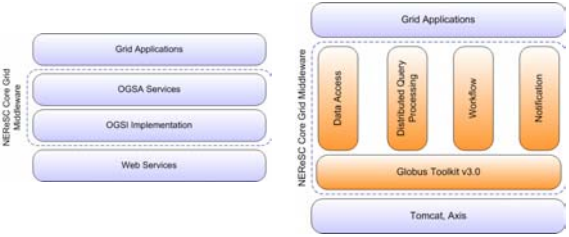
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OGSA Services 



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The NEReSC Core Grid Middleware 



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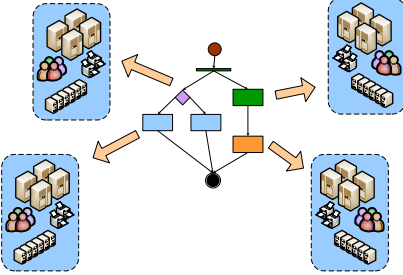
### Plans/Deliverables


- Quality control
- Packaging
- User documentation
- Tutorial material
- Courses on building Grid Services
- UK Level 3 Grid deployment
- Future
  - OGSA-compliance throughout
  - Incorporate "best-of-breed" OGSA services
  - Develop some if necessary
  - Available outside Newcastle
- Initial release
  - September 2003
  - Subsequent releases depending on availability of resources
- Use the myGrid Web Services as test cases
  - Workflow Enactment Service
  - Notification Service

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### myGrid Workflow Enactment Service

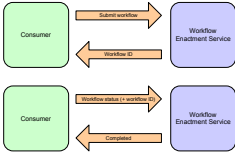
- Produced by IT-Innovations (Southampton)
- Supports WSFL, SCUFL



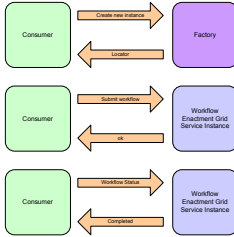
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### myGrid Workflow Enactment Service


Web Service



Grid Service




Could have used extensibility to submit the workflow as part of the instantiation process

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### myGrid Workflow Enactment Service

- Experiences
  - Enactment engine just a jar
    - 23 external jar dependencies
  - Could have used the same interface, exposing the Workflow ID
  - Interface specific to the myGrid project – no GGF standard
    - A different interface and BPEL support as part of an MSc project – same approach though
  - Implementation quite simple
    - A new Grid Service was created that made direct calls to the engine
    - A Grid Service Instance representing each workflow
  - Knowledge of OGSI architecture and concepts required
  - Time spent on learning GT3 and the available tools

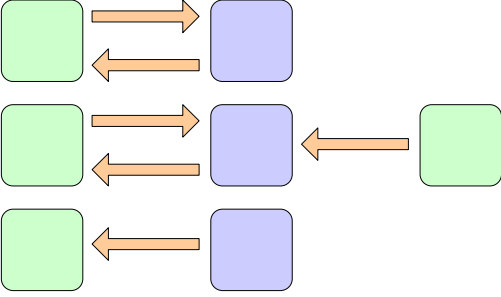
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### myGrid Notification Service

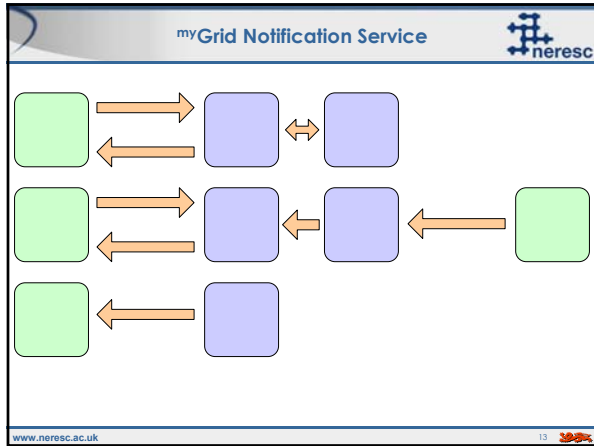
- Produced by University of Southampton
- Publisher/Subscriber – Push/Pull
- Of course, it could be consumed as is
- Could be converted to a very simple Grid Service
  - A Grid Service Instance just provides the same interface – No lessons to be learned
- OGSI defines the optional Notification portType
  - Expose topics as SDEs
  - Still provide operations for pulling messages
  - Significant changes



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### myGrid Notification Service



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- myGrid Notification Service 
- Experiences
    - Notification Service implemented as a servlet
      - Dependencies on mysql, OpenJMS, Tomcat
      - Versioning nightmare if to be combined with other services
    - Very difficult to use the servlet directly
    - A Grid Service Instance sends SOAP messages to the local Notification Service
    - A Grid Service Instance is created for each subscription
    - Interface compatible with OGSi
    - Implementation time-consuming (still in progress)
    - Knowledge of OGSi architecture and concepts required
    - Time spent on learning GT3 and the available tools
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- Conclusions 
- Experience in moving from Web Services to Grid Services
  - Smaller, existing projects difficult to persuade
  - Larger projects, like myGrid, are considering
  - New projects, like GOLD, keen
  - Workflow
    - "Named" workflows using a GSH
    - Stateful interactions with a "named" workflow
    - Expose workflow status through an SDE
  - Notification
    - OGSi-standard interface
    - Topics as SDEs
  - Value in such a transition?
    - Cost of learning OGSi/OGSA, GT3 or other implementation
    - Costs of porting/wrapping
  - Are Web Services enough to build Grid applications?
  - Look at the [Grid Application Framework based on Web Services Specifications and Practices](http://www.neresc.ac.uk/projects/gaf) document
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Read SDEs names

Notification Grid Service Instance

Publisher

SDEs names

Subscribe to SDE (GSR)

Notification Grid Service Instance

Publisher

ok

Subscriber

Subscriber

Delivery

Notification Grid Service Instance