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Implementations of a Service-Oriented Architecture on top of Jini, JXTA and OGSi

Nathalie Furmento, Jeffrey Hau, William Lee, Steven Newhouse and John Darlington

London e-Science Centre, Imperial College London, UK


Across Grids Conference, Nicosia, January 2004

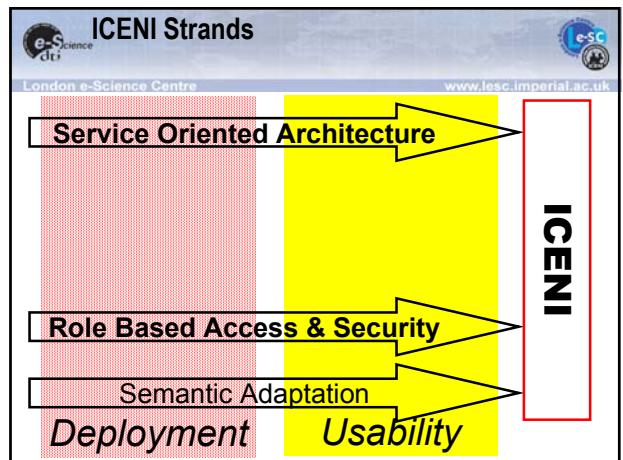
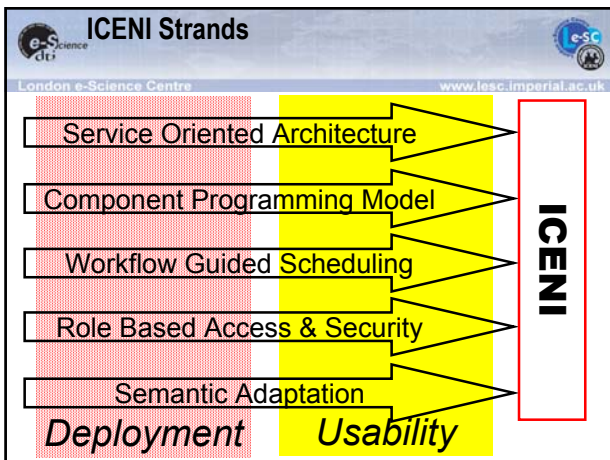



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ICENI: Imperial College e-Science Network Infrastructure

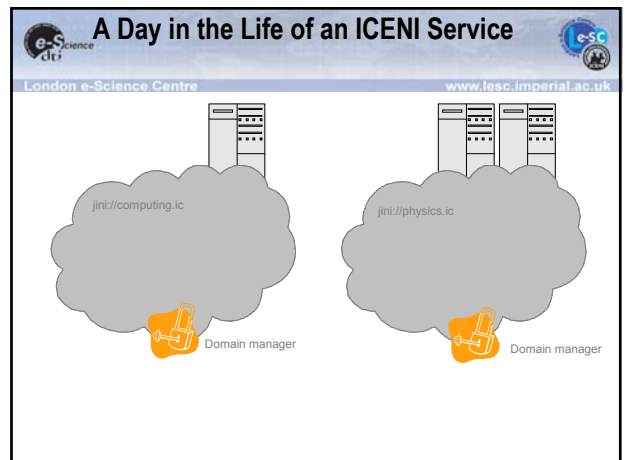
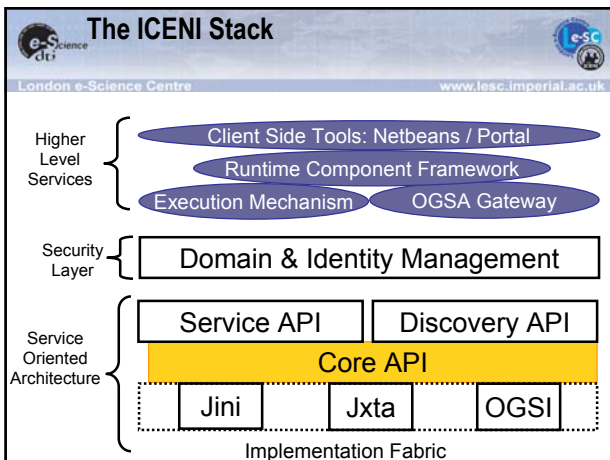
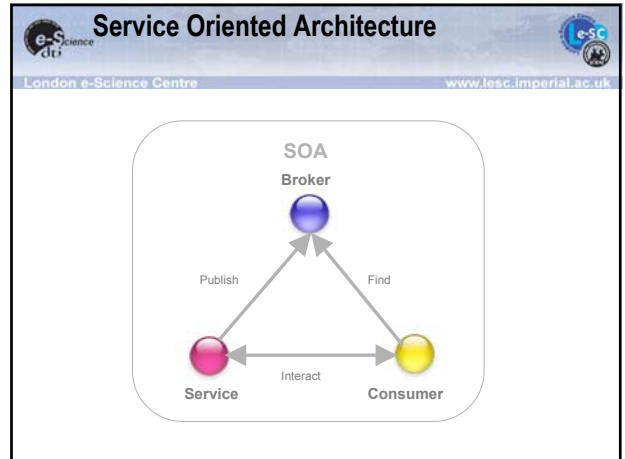
- Integrated Grid Middleware Solution
- Interoperability between architectures, APIs
- Added value layer to other middleware
- Usability: Interactive Grid Workflows
- Deployment: Complete Install from Webstart
- Role and policy driven security
- Foundation for higher-level Services and Autonomous Composition
- ICENI Open Source licence (extended SISSL)

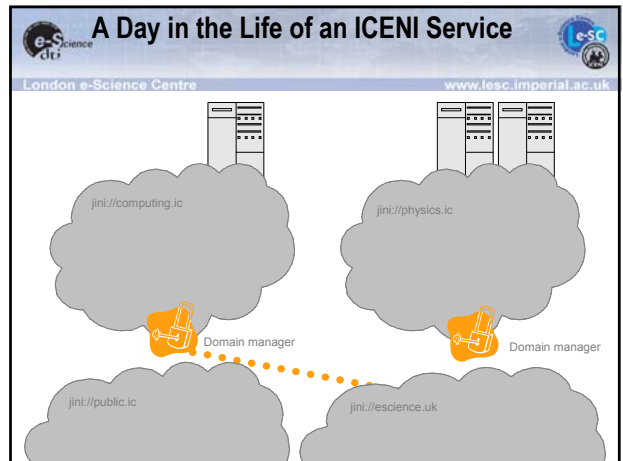
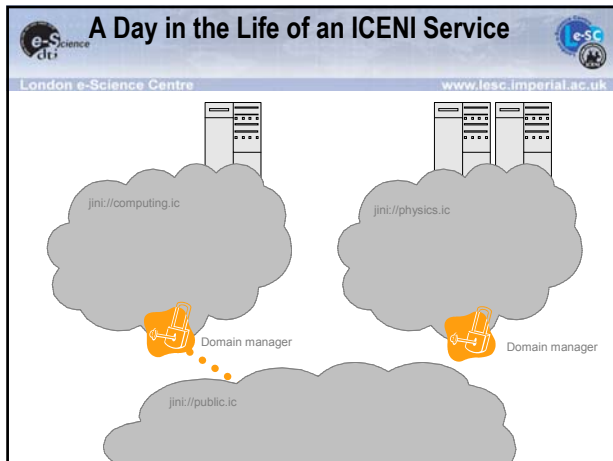




Contents

- Concepts of the Service Oriented Architecture
- Implementations
 - Jini
 - JXTA
 - OGSi
- Comparison of different implementations
- Semantic Adaptation Framework





ICENI Access Contract

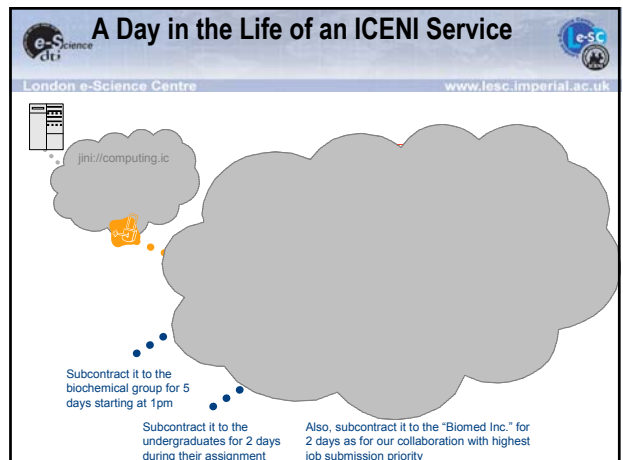
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```

<publicDomain name="vo1">
  <accessPolicy>
    <allow startDay="Monday" stopDay="Friday" stopHour="12">
      <entity type="organisation" name="cScience"/>
    </allow>
  </accessPolicy>
</publicDomain>

```

- **Extensions**
 - Access defined at a method level
 - Quality of service attributes



ICENI Service Interface

```

public interface CounterService extends ResourceService {
    public int addValue(int pValue) throws IceniServiceException;
    public int subtractValue(int pValue) throws
        IceniServiceException;
    public int getValue() throws IceniServiceException;
} // end interface CounterService

```

ICENI Service Implementation

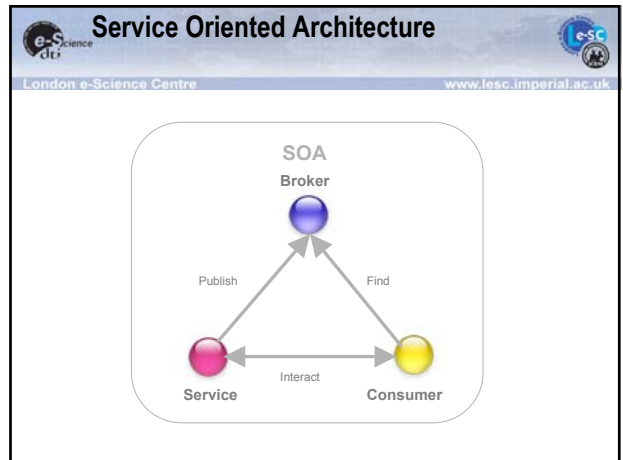
```

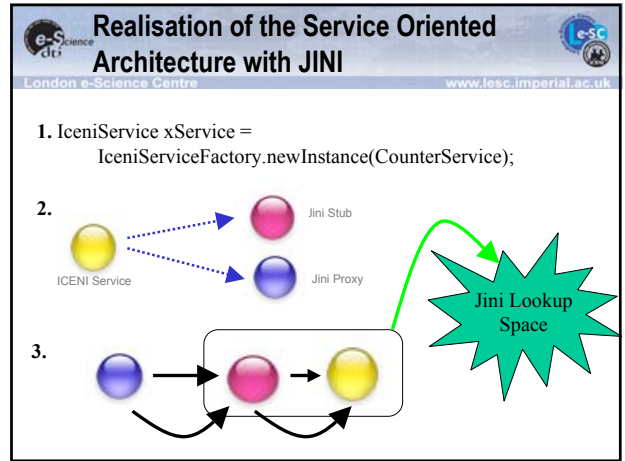
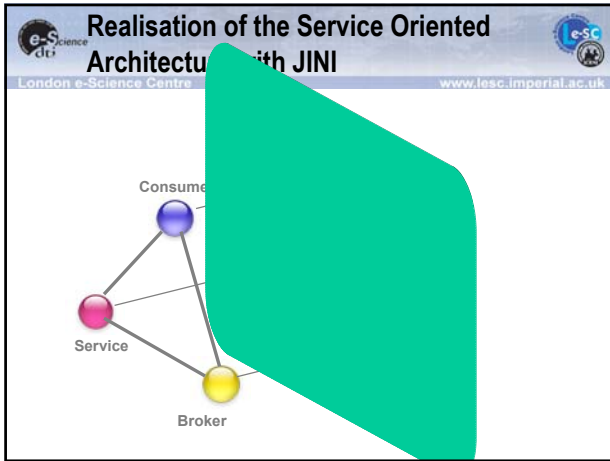
public class Counter extends Resource implements
    CounterService {
    public int addValue(int pValue) throws IceniServiceException {
        ...
    }
    public int subtractValue(int pValue) throws
        IceniServiceException { ... };
    public int getValue() throws IceniServiceException { ... };
} // end class Counter

```

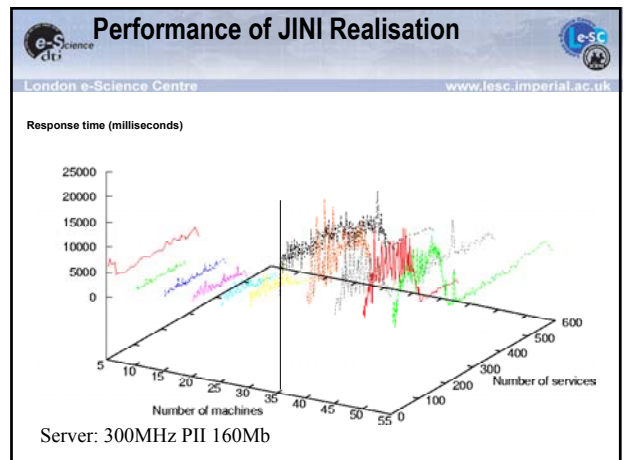
Other requirements

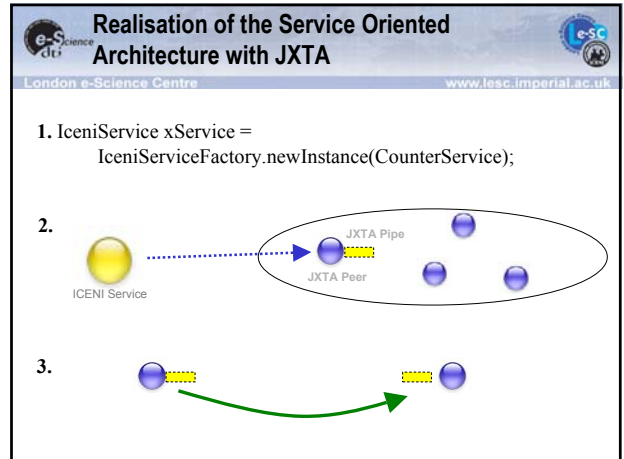
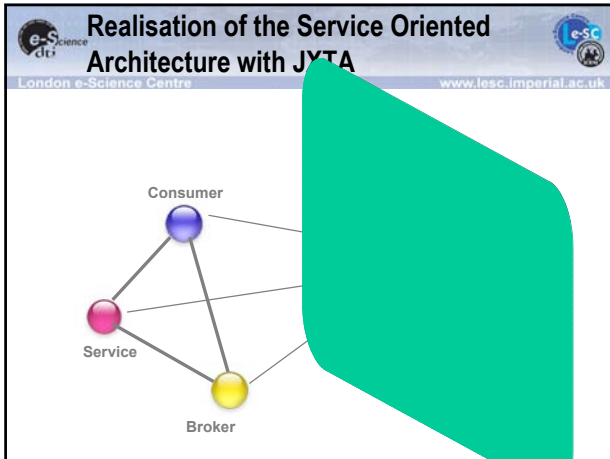
- Notion of service data elements
 - Name, value
 - Liability time interval
- Security
 - Extend the authentication and authorisation model into a full security model
 - Mutual authentication, integrity, and trust



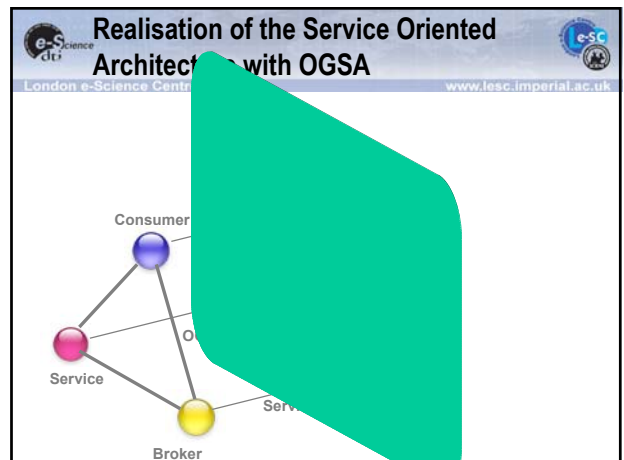


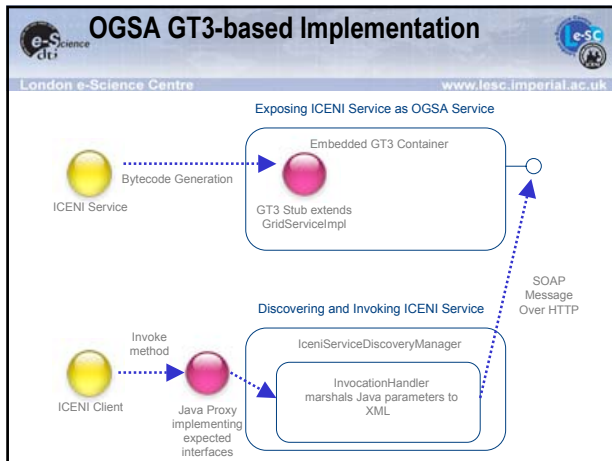
- ### Realisation of the Service Oriented Architecture with JINI
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- Pros
 - One to one mapping
 - Scalability
 - Cons
 - Security
 - Connection through firewall






- Realisation of the Service Oriented Architecture with JXTA
- Pros
 - Easy to create virtual organisation, through JXTA peergroups
 - Can overlay different invocation architectures over JXTA pipes
 - Lightweight, firewall-proof, interchangeable network protocols
 - Cons
 - Security, Consistency
 - No safe removal mechanism for advertisement
 - JXTA is based on XML protocols
 - Doesn't map onto a traditional service oriented architecture



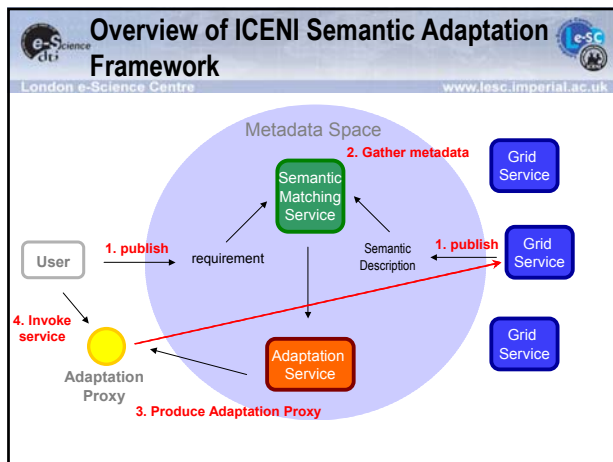
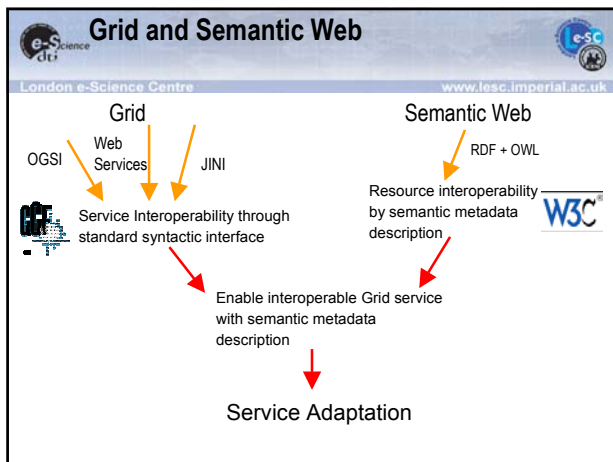


- ## Realisation of the Service Oriented Architecture with OGSA
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- **Pros**
 - Interoperable: ICENI Client and OGSA Client can interact with ICENI services
 - Pluggable transport and messaging protocols
 - **Cons**
 - XML-to-Java marshalling is expensive
 - GT3 is resource hungry, we need lightweight OGSI implementation.
 - XML-Java type mapping is not automatic

- ## Discussion
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- Required basic functionalities are provided by the three implementations.
 - Key points of what we need:
 - Good performances
 - Powerful and extensible model
- ➔ Bringing together the 3 implementations would provide us with a valid and robust SOA.
- 

JINI 2.0

- ## Interoperability
- London e-Science Centre www.lesc.imperial.ac.uk
- **ICENI → OGSA**
 - Gateway to publish ICENI Services as OGSA Services
 - ICENI User Tool is connecting to ICENI/OGSA Services
 - Virtual organisation composed of ICENI/Jini services and ICENI/Jxta services
 - **ICENI → Web services ...**



- ## Acknowledgements
- Director: [Professor John Darlington](#)
 - Technical Director: [Dr Steven Newhouse](#)
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 - David McBride, Angela O'Brien, Ali Afzal
 - Operational Staff:
 - Keith Sephton (Systems Manager)
 - Susan Brookes (Administrative Assistant)
 - Oliver Jevons (Operational Manager)
 - Contacts:
 - E-mail: lesc@ic.ac.uk
 - Web: www.lesc.imperial.ac.uk

ICENI: An integrated Grid Middleware

<http://www.lesc.ic.ac.uk/iceni/>

ICENI Release 1.2 available !!!

ICENI Open Source licence (extended SISSL)

n.furmento@ic.ac.uk

lesc@ic.ac.uk



Involvement in European projects



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- CoreGrid
 - Foundations, Software Infrastructures and applications for large scale distributed, Grid and Peer-to-Peer technologies
 - Programming model & PSE
- GridCC
 - Real time Monitoring of Grid Resources to support e-Science Applications
- EGEE
 - Enabling Grids for e-Science in Europe



Future Works



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- Implement the ICENI's SOA on top of JINI 2.0
 - ➔ Basic SOA + Advanced security model
- Define a protocol allowing different implementations to interact.
 - ➔ Use of OGSA, we already have a JINI to OGSA Gateway.