# Grids@DESY

Investigating Grid Middleware to be used at DESY

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## Introduction: The Idea

*"We will probably see the spread of <u>computer utilities</u>, which, like present electric and telephone utilities, will service individual homes and offices across the country." Len Kleinrock (1969)* 

"A <u>computational grid</u> is a hardware and software infrastructure that provides dependable, consistent, pervasive, and <u>inexpensive</u> access to high-end computational capabilities."I. Foster, C. Kesselmann (1998)

"The <u>sharing</u> that we are concerned with is not primarily file exchange but rather direct access to computers, software, data, and other <u>resources</u>, as is required by a range of <u>collaborative problem-solving</u> and resource-brokering strategies emerging in industry, science, and engineering. The sharing is, necessarily, highly controlled, with resources providers and consumers defining clearly and carefully just what is shared, who is allowed to share, and the conditions under which sharing occurs. A set of individuals and/or institutions defined by such sharing rules what we call a <u>virtual</u> <u>organization</u>."I. Foster, C. Kesselmann, S. Tuecke (2000)

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	Grids?	
<ul> <li>Compute Grids</li> <li>Data Grids</li> <li>Science Grids</li> <li>Access Grids</li> <li>Knowledge Grids</li> <li>Bio Grids</li> <li>Sensor Grids</li> <li>Cluster Grids</li> <li>Cluster Grids</li> <li>Campus Grids</li> <li>Tera Grids</li> <li>Commodity Grids</li> <li>Funding Concept?</li> <li>Marketing Slogan?</li> </ul>		
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Grids: What is a Grid?
I. Foster: What is the Grid? A Three Point Checklist (2002)
"A Grid is a system that:
coordinates resources which are not subject to centralized control
<ul> <li>-&gt; integration and coordination of resources and users of different domains vs. local management (batch) systems</li> </ul>
using standard, open, general-purpose protocols and interfaces
-> standard and open multi-purpose protocols vs. application specific systems
to deliver nontrivial qualities of services."
-> coordinated use of resources vs. uncoordinated approaches (web)
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### Certificates

- Authorization and authentication are essential ingredients of Grids
- A certificate is an encrypted electronic document, digitally signed by a Certification Authority (CA)
- A Certificate Revocation List (CRL) is published by the CA
- For Germany, GridKa issues certificates on request (needs ID copy)
- Contacts at DESY: R. Mankel, A. Gellrich
- Users, hosts, and services must be certified
- The Globus Security Infrastructure (GSI) is part of the Globus Toolkit
- GSI is based on the openSSL Public Key Infrastructure (PKI)
- X.509 certificates are issued
- The certificate is used via a token-like proxy
- Example: /O=GermanGrid/OU=DESY/CN=Andreas Gellrich

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Grid Testbed: Set-up	
<ul> <li>Authentication:</li> <li>Grid Security Infrastructure (GSI) based on PKI (openSSL)</li> <li>Globus Gatekeeper, Proxy renewal service</li> <li>A central LDAP-server defines the VOs</li> </ul>	
<ul> <li>Grid Information Service (GIS):</li> <li>Grid Resource Information Service (GRIS)</li> <li>Grid Information Index Service (GIIS)</li> </ul>	
Resource Management: • Resource Broker, Job Manager, Job Submission, Batch System (PBS), Logging and Bookkeeping	
<ul> <li>Storage Management:</li> <li>Replica Catalogue,GSI-enabled FTP, GDMP</li> <li>Replica Location Service (RLS)</li> </ul>	
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	Grid Testbed: Proxy	
gellrich@grid003 Your identity: /O= Enter GRID pass Creating proxy Done Your proxy is val	:: [~] grid-proxy-init =GermanGrid/OU=DESY/CN=Andreas Gellrich = phrase for this identity: 	
gellrich@grid003 subject : issuer : type : strength : timeleft :	:: [~] grid-proxy-info -all /O=GermanGrid/OU=DESY/CN=Andreas Gellrich/CN=proxy /O=GermanGrid/OU=DESY/CN=Andreas Gellrich full 512 bits 11:59:48	
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Grid Testbed: Job Submit	
gellrich@grid003: [~] dg-job-submit hostname.jdl	
Connecting to host grid006.desy.de, port 7771 Logging to host grid006.desy.de, port 15830	**
JOB SUBMIT OUTCOME The job has been successfully submitted to the Resource Broker. Use dg-job-status command to check job current status. Your job identifier (dg_joblo is: https://grid006.desy.de:7846/131.169.223.35/134721208077529?grid006.desy.de:7 71	d) 7 **
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Grid	Testbed: Status cont'd	
continued:		
dg_JobId https://grid006.desy de:7771 Status Last Update Time (UTC) Job Destination Status Reason Job Owner Status Enter Time (UTC) Location	<ul> <li>de:7846/131.169.223.35/134721208077529?grid006.</li> <li>Scheduled -&gt; Done -&gt; OutputReady -&gt; Cleared</li> <li>Thu Oct 23 13:47:38 2003</li> <li>grid007.desy.de:2119/jobmanager-pbs-infinite</li> <li>initial</li> <li>/O=GermanGrid/OU=DESY/CN=Andreas Gellrich</li> <li>Thu Oct 23 13:47:38 2003</li> <li>GlobusJobmanager/grid007</li> </ul>	desy. າ
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	Grid T	estbed: Job Log	cont'd	(
111 - 5	. RB <sup>.</sup>			
•	JobAccept:	Broker	RB / arid006	
•	JobTransfer:	UI -> Broker	UI / grid003	
•	JobMatch:	Broker	RB / grid006	
•	JobAccept:	JobSubmissionService (JSS)	RB / grid006	
•	JobTransfer:	Broker -> JSS	RB / grid006	
RB <	<-> CE:			
•	JobAccept:	GlobusJobManager	CE / grid007	
•	JobScheduled:	GlobusJobManager	CE / grid007	
•	JobTransfer:	JSS	RB / grid006	
•	JobDone:	GlobusJobManager	CE / grid007	
•	JobRun:	JSS	RB / grid006	
•	JobDone:	JSS	RB / grid006	
•	JobRun:	Broker	RB / grid006	
•	JobDone:	Broker	RB / grid006	
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Grid Testbed: Job Output	
gellrich@grid003: [~] dg-job-get-output 'https://grid006.desy.de:7846/131.169.223.35/134721208077529?grid00 de:7771'	6.desy.
*****	******
JOB GET OUTPUT OUTCOME Output sandbox files for the job:	
- https://grid006.desy.de:7846/131.169.223.35/134721208077529?grid006 de:7771	3.desy.
have been successfully retrieved and stored in the directory: /tmp/134721208077529	
***************************************	*****
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Grid Testbed: Using RC	
gellrich@grid002: [~] less file.jdl	
InputData = {"LF:file.txt"}; DataAccessProtocol = {"file", "gridftp"}; ReplicaCatalog = "Idap://grid001.desy.de:9011/ Ic=DesyCollection, rc=DesyRC,dc=grid001,dc=desy,dc=de"; gellrich@grid002: [~] Is -I /flatfiles/grid002/desy -rwxr-xr-x 1 gdmp root 13 Oct 24 11:18 file.txt	
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# International Lattice Data Grid http://www.lqcd.org/ildg/ ILDG develops an international Data Grid for the lattice field theory community Metadata WG: An XML Schema suitable for describing the data generated by lattice field-theory is developed (member: D. Pleiter) Middleware WG: A heterogeneous Grid-of-Grids based on Web Services API to connect to archives (NERSC, CP-PACS, UKQCD) (member: A. Gellrich) Testbeds to test interoperability: aggregate replica catalogues, starting with just listing the contents of the Grid-of-Grids Allow public access via Web Services and/or HTTP

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