



Learning GRID

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In this Issue:

- 1 – Editorial
- 2 – A Conceptual Model for Grid Learning Services Automatic Composition
- 4 – Research Project Focus: edutain@grid
- 3 – What Just Happened? Summer 2007 Conference round-up
- 7 – When What Where

Editorial

Welcome to the thirteenth issue of the Kaleidoscope Learning Grid SIG newsletter!

The featured article this month comes from our colleagues at the Open University of Catalonia. They present work they have done in creating a model for the multi-level composition of Grid-based learning services which leverages the existing metadata schemas of e-learning frameworks. The implementation of this type of functionality is essential to the realisation of the Learning Grid vision: the Learning Grid should be able to combine low-level services available on the Grid in order to provide the learner with a rich and seamless learning experience through a composed and complex learning service.

This issue's project focus falls on the EU-funded FP6 STREP edutain@grid, which excitingly promises to provide a Grid middleware layer for the development of responsive and interactive Grid applications.

It has been a busy summer of conferences, and with so many different research areas feeding in to the vision of Learning Grid it becomes difficult to keep track of everything that is happening, and impossible to attend all the events with interesting and relevant papers.

For this reason the extended news section in this issue provides a round-up of the most pertinent conferences and workshops which have taken place since the release of the last newsletter. So, when you get a chance, make some time to find out what just happened and follow up some of the web links to track down the latest papers.

The main topics of the events reported on are diverse, and include Semantic Web technologies,

Web Services and Service-Oriented Architectures, Grid middleware, personalised and computer-aided learning, multimedia and information retrieval. For Learning Grid to become a successful reality then challenges from all of these areas (and probably more) will need to be addressed. It certainly is a lot to keep up with!

The newsletter concludes, as always, with the *When, What, Where* listings of forthcoming events of interest. This issue we cover the period up until Christmas. The bumper four pages of events shows that there is much activity at the moment in the research areas relevant to Learning Grid. The necessary component technologies are beginning to mature, and are increasingly being incorporated into production-quality systems. This can only be good news for the Learning Grid vision.

Kevin Keenoy
Learning Grid SIG Member

A Conceptual Model for Grid Learning Services Automatic Composition

Featured Article by Gustavo Gutiérrez-Carreón, Thanasis Daradoumis and Josep Jorba

This work proposes an initial model for the automatic composition of Grid based learning services based on the semantic capabilities and metadata of e-learning frameworks.

Motivation

There are three principal motivations for Learning Grid Services Composition: build a more powerful service using basic existing services, fulfil service requester's requirement better, and enhance resource reuse while reducing the cost and time of a new service development.

Learning Service Discovery and Composition

Let us consider a learning Grid as a set of resources and services distributed in a network with the service model based on the IMS abstract framework [1], where learning services can be composed by others allocated in different repositories inside the network. The model we propose for the automatic composition of learning services is based on the use of the defined syntactic and semantic characteristics of the different levels of services involved in the Learning Abstract Framework. The design of the model is presented in Fig. 1 and is described below.

Using web languages, such as RDF, DAML+OIL, and OWL, it is possible to create semantically rich data models that are denominated semantic schemas [2]. These semantic schemas are made up of triples (subject-predicate-object), where

subjects and objects are entities, and predicates indicate relationships between those entities. Discovery is the process of finding Web services with a given capability [3]. In general, discovery requires that Web services advertise their capabilities with a registry, and that requesting services query the registry for Web services with particular capabilities. In our model, once the semantic schema of the tool or learning service that we want to build is designed, we have to pass it to our discovery process that will locate a set of different level services in the Learning Grid. The operation of these services as a whole allows us to carry out the processes defined in the schema. This process consists primarily on comparing inputs and outputs of a service as semantic concepts represented in the schema to incorporate semantics about learning services accessible by a discovery service. The result of the search will be a group of suitable schemas that conforms to the functional process described in our initial schema. Schema and ontology matching aim at identifying semantic correspondences between metadata structures or models such as database schemas, XML message formats, and ontologies. The resulting schemas of discovery process will be compared to the initial schema through a Matching process that is based on a structural matching approach and on a taxonomy matcher and whose result will be the best evaluated schema for our learning tool or services. The taxonomy matcher draws on the given taxonomic Metadata to deduce whether two elements are related semantically. The result of this matching process will be a ranking of semantic matching results. This ranking can be used in conjunction with other user-defined constraints to inform of an exact, or potentially useful web-service capability match.

Conclusion

Comparing our conceptual model with the work presented in [4 and 5], our approach represents a complete alternative solution since, on the one

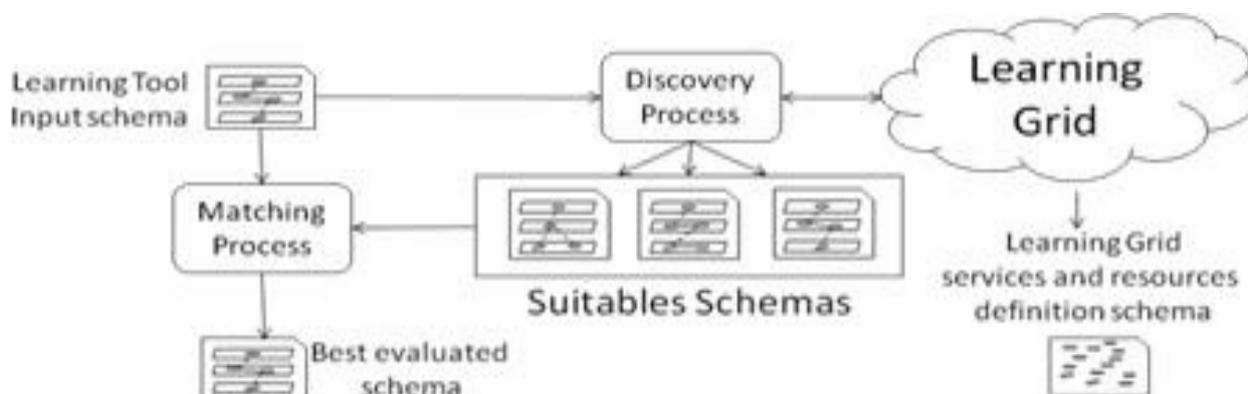


Fig. 1 Grid Learning services automatic composition

hand, we provide a multi-level learning services composition method that enables the construction of complex learning services by means of other low level services, depending on the nature of the learning abstract framework. On the other hand, our approach takes advantage of the semantic and syntactic characteristics of learning services, which facilitates a totally automatic construction of new learning tools based on others previously created. Future work aims at the full implementation of the conceptual model presented in this work in a Grid environment with a real time composition of learning collaborative scenarios and portals based on the grid.

Acknowledgement

This work has been partially supported by the Spanish Ministry of Education under grant TSI2005-08225-C07-05.

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- [3] Jennifer M. Schopf, Mike D'Arcy, Neill Miller, Laura Pearlman, Ian Foster, and Carl Kesselman, *Monitoring and Discovery in a Web Services Framework: Functionality and Performance of the Globus Toolkit's MDS4*, Argonne National Laboratory Tech Report ANL/MCS-P1248-0405, April 2005.
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- [5] Shalil Majithia, David W.Walker, W.A.Gray, *Automated Composition of Semantic Grid Services*, International Conference on Autonomic Computing (ICAC'04), May, 2004.

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Research Project Focus: edutain@grid

Edutain@grid is an EU FP6 project which plans to open the benefits of GRID technology to the wider public through two pilot applications in interactive gaming and e-learning.

The project is one year old this month (with another two years to go), so it is an opportune time to catch up with the progress so far.

Project Aims

The edutain@grid project [1] is developing middleware that will allow application developers to access Grid technology without any need to explicitly manage the Grid infrastructure. One of the primary requirements of the middleware is that it should maintain the responsiveness and interactivity which is expected by application developers but which is not possible with existing Grid applications. To this end, the project focuses on the development of a new class of "killer" Grid application: Real-Time Online Interactive Applications (ROIAs). The two pilot applications they propose are one for massively multi-player interactive gaming and one for e-learning.

Multi-Player Interactive Gaming ROIA

Due to networking and hardware constraints it is currently only possible to have multi-player interactive gaming of two types: (1) fast action games with just a few players (such as first-person shooter games like *Doom*), or (2) slower adventure games with several thousand players (such as multi-player online role-playing games like *World of Warcraft*). Edutain@grid plans to make a third option possible through the use of the Grid by developing a massively multiplayer fast action game.

The French software company Darkworks [2] (which is one of the project partners) has already developed a fast-paced action game which is to be made massively multi-player through the use of the Grid.

E-Learning ROIA

The e-learning pilot ROIA is based on training applications developed by project partner BMT Cordah, in the field of maritime Search and Rescue. Like the multi-player interactive gaming ROIA the e-learning pilot aims to overcome the constraints of current technology through the use of the Grid. In the case of e-learning applications the current limitations on bandwidth have implications for the levels of student interactivity and media richness that can be

achieved. This is of particular relevance to e-learning for crisis management (the field of the pilot ROIA), where high levels of communication and interaction are required.

The edutain@grid Architectural Approach

The edutain@grid technology is to be generic, scalable, and secure in nature. Sophisticated Grid middleware services, distributed real-time computation, and easy to configure user portals will be provided by a three-layer service-oriented architecture. This architecture will separate transaction and deployment activities from real-time delivery mechanisms to ensure that the required levels of responsiveness and interactivity are achieved.

The three layers are:

- 1) Business layer (handles transactions between ROIA customers and suppliers)
- 2) Management layer (determines how ROIAs should be deployed to meet current user demand)
- 3) Real time layer (freed from commercial and Grid management considerations, this layer provides rapid response and interaction times)

Status Quo

The plans for the project (as described above) are clear, but there is not yet any indication of when development of the pilot ROIAs will be ready for user testing, or when there might be a release of the generic middleware for application developers to work with. However, if edutain@grid is successful in creating genuinely generic middleware tools for responsive, interactive Grid applications over the next 24 months then it will be an important and exciting development en route to the realisation of the Learning Grid vision.

The September 2007 edutain@grid Newsletter can be downloaded from:

http://www.edutaingrid.eu/images/newsletter/newsletter_september_07.ppt

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- [1] <http://www.edutaingrid.eu>
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What Just Happened?

Summer 2007 Conference round-up

It has been a busy summer of conferences since the last newsletter was released. Here is your chance to catch up with what you missed.

RIAO 2007: Large-Scale Semantic Access to Content (Text, Image, Video and Sound)

30th May-1st June

RIAO (Research of information assisted by computer) is a conference organised every three years. The focus is towards advances in information retrieval technologies, many of which could be of great use in Learning Grid. This year's conference featured sessions on video, image, sound and music retrieval, as well as on automated provision of facts, answers to questions and summaries of information.

All papers can be downloaded from the "Conference Program" page of the conference website.

<http://riao.free.fr/>

Workshop on Large-Scale Distributed Systems for Information Retrieval

27th July

LSDS-IR was held in Amsterdam in July, in conjunction with the ACM SIGIR conference. Learning Grid requires powerful information retrieval capabilities if learning resources available are to be found by learners. Papers at the workshop address topics such as peer-to-peer searching (which is one possibility for learning grid) and recommendation systems in a decentralised environment.

The proceedings are not yet available on-line but individual author's websites may provide pre-prints

<http://www.tel.fer.hr/llds-ir/>

Workshop on Contexts and Ontologies

21st August

The Third International Workshop on Contexts and Ontologies: Representation and Reasoning was held at Roskilde University, Denmark in August. The aim was to bring people from the context and ontology communities together to discuss approaches used for information integration.

An effective Learning Grid will require methods to represent and reason about knowledge which is scattered in a large set of contexts and ontologies, and this is the problem tackled by this workshop. All the papers are now available on-line.

<http://www.c-and-o.net/>

UNICORE Summit 2007

28th August

The third annual UNICORE summit was held in Rennes, France in August. Papers presented at the summit included several on authorization and authentication in UNICORE grids, one about UGSF which is a streaming server which builds streaming infrastructure for the existing computational grid middleware, and one proposing embedding the Grid into the existing Web, thus empowering the user to make the best use of the Grid and the information contained in it.

All the presentations from the summit are now available on-line and can be viewed at:

<http://www.unicore.eu/summit/2007/>

International Workshop on Service Oriented Software Engineering

3rd September

The 2nd International Workshop on Service Oriented Software Engineering (IW-SOSWE 2007) was held in Dubrovnik, Croatia in September.

Learning Grid applications will employ various learning services to provide their functionality. There are many engineering challenges in making this work smoothly, such as how to design services which easily co-operate with one another and establishing trust between software services. These are the kinds of problem addressed by papers at this workshop.

Workshop papers and proceedings are now available for download.

<http://www.selab.isti.cnr.it/IW-SOSWE07/>

IEEE International Conference on Semantic Computing

17th-19th September

The First IEEE International Conference on Semantic Computing was held in Irvine, California, USA in September.

The packed and interesting programme included sessions on semantic computing, services and software engineering, multimedia retrieval, knowledge engineering and multimedia semantics.

<http://icsc2007.eecs.uci.edu/>

International Conference on Service-Oriented Computing

17th-20th September

The Fifth International Conference on Service-Oriented Computing was held in Vienna, Austria in September. The packed conference programme included many papers likely to be of interest to Learning Grid SIG members, both in the workshop sessions and main conference proceedings. Some of the relevant topics covered included:

- Self-management in Service-oriented computing
- The fusion of Service-Oriented Architectures and Grid
- Service selection and composition strategies

The full proceedings are to be published by Springer and so are not on-line, but pre-prints of many of the papers can be found on the web at individual author's web pages.

The complete programme can be found at: <http://www.ece.cmu.edu/icsoc2007/icsoc2007-prelimProgram.pdf>

Workshop on Cross-Media and Personalized Learning Applications on top of Digital Libraries

20th September

LADL 2007 was held in Budapest, Hungary in September, in conjunction with the 11th European Conference in Research and Advanced Technology for Digital Libraries (ECDL 2007). Although the workshop was not specifically related to Grid its topic is directly relevant: Personalized learning applications over large (possibly distributed) repositories of learning resources are what Learning Grid is all about.

Papers presented cover topics such as personalised resource sequencing and resource repurposing and re-use in different contexts.

Presentations from the workshop are already available on-line from the website, and the full papers should also be there soon.

<http://ladl2007.cc.bas.bg/>

Grid Services Engineering and Management

24th-26th September

The fourth International Conference on Grid Service Engineering and Management was held in Leipzig, Germany in September. It included sessions on grid and application specification, grid computing and grid applications, and service composition.

<http://www.ict.swin.edu.au/conferences/gsem2007/>

International Conference on High Performance Computing and Communications

26th-28th September

The HPCC-07 conference was held in Houston, Texas, USA in September. Twelve of the accepted papers fell under the umbrella of Grid Computing, and cover topics such as job scheduling, resource selection, security and performance analysis.

The proceedings are available on-line.

<http://www.tlc2.uh.edu/hpcc07/>

International Conference on Interactive Computer aided Learning

26th-28th September

ICL2007 was held in Villach, Austria in September. The main focuses of the conference were "Web 2.0" & mash-ups, and collaborative learning environments, both of which are pertinent to Learning Grid. The two workshops on aspects of "next generation e-learning" were particularly relevant, as were the paper sessions on new learning models and applications, adaptive and intuitive environments, remote and virtual laboratories, and adaptive environments and collaborative learning.

The proceedings are not yet available on-line but pre-prints for at least some of the papers are available from individual author's websites.

<http://www.icl-conference.org/>

International Workshop on the Many Faces of Multimedia Semantics

28th September

WMS'07 was held in conjunction with ACM Multimedia in Augsburg, Germany in September.

Management of multimedia resources using semantic metadata will be a key function of the Learning Grid. The programme of this workshop included papers on the automatic extraction and indexing of metadata for reuse of e-Learning multimedia objects, pictorial ontologies and ontologies for personalised video retrieval.

<http://www.kettering.edu/orgs/wms07/>

When	What	Where
October 11 th -13 th , 2007	<p>The 2007 International Workshop on Intelligent Pervasive Middleware (IPM 2007)</p> <p>To be held in conjunction with the 2007 International Conference on Intelligent Pervasive Computing (IPC-07).</p> <p>The main objective of the intelligent pervasive middleware workshop is to bring together researchers and practitioners working in middleware systems with topics ranging from different areas in pervasive computing such as agent based computing, service oriented computing, intelligent systems, P2P computing, sensor networks and database issues under one roof with an aim of encouraging exchange of ideas and experiences among these diverse areas.</p> <p>http://www.sersc.org/IPC2007/IPM2007.php</p>	Jeju Island, Korea
October 15 th -17 th , 2007	<p>Cracow Grid Workshop</p> <p>The Cracow Grid Workshop is organized for the 7th time to support community of researchers, developers, practitioners as well as current and potential grid users who work in the fascinating field of grid technologies and their applications.</p> <p>CGW'07 will cover:</p> <ul style="list-style-type: none"> - current advances in grid systems and grid applications, - overview of the main European and national grid projects, - Virolab tutorial. <p>www.cyfronet.krakow.pl/cgw07/</p>	Cracow, Poland
October 18 th -20 th , 2007	<p>International Symposium on Intelligent and Distributed Computing - IDC'2007</p> <p>The aim of this symposium is to bring together researchers involved in intelligent and distributed computing to allow cross-fertilization and synergy of ideas and to enable advancement of researches in the field.</p> <p>http://software.ucv.ro/~badica_costin/idc2007/</p>	Craiova, Romania
October 22 nd -24 th , 2007	<p>International Workshop on Collaborative System Design and Applications</p> <p>Collaborative systems have caused a drastic change in the way people focus work and learning, especially at a distance. P2P and grid middleware and applications have opened new interesting possibilities for collaboration and learning.</p> <p>This workshop aims at providing a forum for academic researchers, professionals and practitioners to exchange their experiences and their ideas about problems and solutions related to the design, development and use of groupware systems and applications.</p> <p>http://www.isda07.eng.uerj.br/workshops/?w=9</p>	Rio de Janeiro, Brazil
October 28 th , 2007	<p>Second International Workshop on Modular Ontologies</p> <p>The proposed workshop aims to bring together researchers and practitioners to discuss the current state of the art and open research problems in ontology modularization and integration.</p> <p>http://webrum.uni-mannheim.de/math/Iski/WoMO07/</p>	Whistler, British Columbia, Canada

When	What	Where
October 29 th -31 st , 2007	<p>3rd International Conference on Semantics, Knowledge and Grid (SKG 2007)</p> <p>The International Conference on Semantics, Knowledge and Grid (SKG) is a cross-area international forum on semantic computing, knowledge networking, and grid computing. SKG promotes cross-area research and pushes the development of relevant areas.</p> <p>http://www.culturegrid.net/SKG2007/</p>	Xi'an, China
October 29 th -31 st , 2007	<p>3rd International Conference on Next Generation of Web Services Practices (NWESP 2007)</p> <p>International Conference on Next Generation Web Services Practices (NWeSP'07) is a forum which brings together researchers and practitioners specializing on different aspects of Web based information systems. The conference will bring together the world's most respected authorities on semantic web, Web based services, Web applications, Web enhanced business information systems, e-education specialists, Information security, and other Web related technologies.</p> <p>http://nwesp.org/nwesp07/</p>	Seoul, Korea
November 4 th -9 th , 2007	<p>International Conference on Mobile Ubiquitous Computing, Systems, Services and Technologies</p> <p>Featuring the workshops:</p> <ul style="list-style-type: none"> • WSNEXT 2007: International Workshop on Web Services Evolution and Applications • MUTL 2007: International Workshop on Mobile and Ubiquitous Technologies for Learning <p>http://www.iaia.org/conferences2007/UBICOMM07.html</p>	Papeete, French Polynesia (Tahiti)
November 6 th , 2007	<p>International Workshop on Intelligent and Adaptive Web-based Educational Systems (IAWES 2007)</p> <p>Held in conjunction with the International Conference on Computers in Education, this workshop focuses on how intelligent support and adaptive features can be integrated in currently used systems as well as on how intelligent and adaptive Web-based educational systems can be improved in order to provide a better learning environment for learners.</p> <p>http://wit.tuwien.ac.at/iawes2007</p>	Hiroshima, Japan
November 11 th -15 th , 2007	<p>The 6th International Semantic Web Conference and the 2nd Asian Semantic Web Conference, 2007</p> <p>Semantic Web technologies are likely to be key in enabling the Learning Grid.</p> <p>In addition to the main research track, ISWC 2007 will include a Semantic Web In Use track, a poster and demonstration track, a doctoral consortium, and a special competition known as the Semantic Web Challenge.</p> <p>Although the event hasn't happened yet the accepted papers are already on-line; click the link to "ISWC 2007 + ASWC 2007 Talk Selector" from the conference home page to download them.</p> <p>http://iswc2007.semanticweb.org</p>	Busan, Korea

When	What	Where
November 11 th , 2007	<p>First International Joint Workshop on Service Matchmaking and Resource Retrieval in the Semantic Web (SMR2 2007)</p> <p>Co-located with the 6th International Semantic Web Conference ISWC 2007, this workshop provides a forum for promoting, presenting, and discussing the latest scientific advances on semantic Web service and resource retrieval.</p> <p>http://www-ags.dfki.uni-sb.de/~klusch/smr2/</p>	Busan, Korea
November 25 th -30 th , 2007	<p>International Symposium on Distributed Objects and Applications (DOA'07) and Grid computing, high-performance and Distributed Applications (GADA'07)</p> <p>Part of the On The Move (OTM) federated conferences and workshops, these should both be of relevance to Learning Grid.</p> <p>http://www.cs.rmit.edu.au/fedconf/index.html?page=doa2007cfp</p>	Vilamoura, Algarve, Portugal
November 26 th , 2007	<p>Workshop on Middleware for Service Oriented Computing</p> <p>The immediate need of middleware support for Service Oriented Architectures is evident, but current approaches and solutions mostly fall short by primarily providing support for the Enterprise Application Integration aspect of Service Oriented Computing only and do not sufficiently address composition support, service management and monitoring.</p> <p>This workshop will consider how specifically service oriented middleware can address the above challenges, to what extent it has to be service oriented by itself, and in particular how quality properties are supported.</p> <p>http://www.dedisys.org/mw4soc07/</p>	Newport Beach, California, USA
November 26 th -28 th , 2007	<p>The 5th European Conference on Web Services (ECOWS 2007)</p> <p>The IEEE European Conference on Web Services (ECOWS) is the premier conference for both researchers and practitioners to exchange the latest advances in the state of the art and practices of Web Services. The main objectives of this conference are to facilitate the exchange between researchers and practitioners and to foster future collaborations in Europe and beyond.</p> <p>http://www.ecows2007.uni-halle.de/</p>	Halle (Saale), Germany
December 3 rd - 6 th , 2007	<p>International Conference on Parallel and Distributed Computing, Applications and Technologies (PDCAT)</p> <p>PDCAT is a major forum for scientists, engineers, and practitioners throughout the world to present the latest research, results, ideas, developments and applications in all areas of parallel and distributed computing.</p> <p>http://www.cs.adelaide.edu.au/users/pdcat07/</p>	Adelaide, Australia
December 6 th -8 th , 2007	<p>International Conference on Future Generation Communication and Networking (FGCN-07)</p> <p>The Future Generation Communication and Networking (FGCN) have emerged rapidly as an exciting new paradigm that includes ubiquitous, grid, and peer-to-peer computing to provide computing and communication services at any time and anywhere.</p> <p>FGCN2007 provides a chance for academic and industry professionals to discuss recent progress in the area of Communication and Networking including modelling, simulation and novel applications associated with the utilization and acceptance of computing devices and systems.</p> <p>http://www.sersc.org/FGCN2007/</p>	Jeju Island, Korea

When	What	Where
December 10th-12th, 2007	<p>The Second IEEE International Workshop on Multimedia Technologies for E-Learning (MTEL)</p> <p>Due to its potential to make learning easier, more convenient, and more effective, education is one of the pre-eminent areas of applications for multimedia. Held in conjunction with the 9th IEEE International Symposium on Multimedia (ISM2007), this workshop aims at bringing together researchers who are interested in the intersection area between the technological point of view and the human-centred view.</p> <p>http://www.math.tu-berlin.de/~knipping/ieee/ism07-mtel/</p>	Taichung, Taiwan
December 10th-12th, 2007	<p>The IEEE International Workshop on Web 2.0 and Multimedia-enabled Education (W2ME 2007)</p> <p>Web 2.0 has become a major technology that supports multimedia content publishing and sharing over the Internet. One of the essential goals of applying Web 2.0 and multimedia-enabled technologies in education is to enhance interactive communication and collaboration among participants in Web-based learning.</p> <p>Held in conjunction with the 9th IEEE International Symposium on Multimedia (ISM2007), this workshop will bring together researchers and practitioners in a small focused working group to form communities of practice and international ties, exchange ideas and experiences, identify state of the art; explore open research issues, propose, formulate, and evaluate promising solutions in the Web 2.0 and multimedia-enabled education.</p> <p>http://w2me2007.ncu.edu.tw/</p>	Taichung, Taiwan
December 10th-13th, 2007 (one day)	<p>International Grid Interoperability and Interoperation Workshop 2007 (IGIIW 2007)</p> <p>The workshop will discuss the interoperability and interoperation aspects of current Grid and Web technologies, production Grid infrastructures in general, and the interoperability through emerging open standards in particular.</p> <p>The goal of this workshop is to bring together researchers and practitioners working in the area of interoperability and interoperation within Grid infrastructures and distributed environments, to exchange and share their experiences, new ideas, and latest research results as well as open problems.</p> <p>http://omii-europe.org/OMII-Europe/igiiw2007.html</p>	Bangalore, India