

ADAPT
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*Middleware Technologies for Adaptive and
Composable Distributed Components*

Progress Management Report 2



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Contents

1	Executive Summary	3
2	Project Rationale and Exploitation Plan	3
2.1	Rationale	3
2.2	Exploitation Plan	3
3	Project Objectives	6
4	Achievements and Project Status	6
5	Adherence to Workplan	9
5.1	Resource Usage	9
5.2	Deliverable Schedule Update	9
5.3	Modifications to Workplan	9
6	Cooperation in the Project	9
6.1	Fourth Adapt Plenary Workshop. Bologna, 11-12 December 2003.	9
6.2	Other Cooperation	10
7	Coordination with other Projects/Programmes	10
8	Promotion/Information Dissemination	11
8.1	Standardization Bodies	11
8.2	Publications	12
8.3	Dissemination activities	12
9	Conclusion	13
10	Appendices	14
10.1	Updated Consortiums Relevant Persons Working and/or Associated to the Project	14

1 Executive Summary

The ADAPT project is interested in developing support for the creation of adaptable web services. Web services have been proposed as a platform independent middleware solution that can interconnect components and applications across organizations. Two kinds of web services can be distinguished. Basic web services, those that do not rely on other services. And composite web services that invoke other web services to achieve their functionality. One of the main challenges being faced in the web service arena is how to achieve dynamically adaptable services. That is, services that adapt themselves to the changing environment. The way to achieve this adaptability is different in basic and composite services. For basic services, a generic infrastructure to build dynamic web services is needed. This generic infrastructure will enable the creation of web services that can adapt dynamically (i.e., while being online) to events such as site failures, site recovery, reconfigurations and changes in the load. On the other hand, adaptability in composite services takes a different form. Composite service adaptability consists in adapting the composition to changes in its constituent services. Additionally, what is especially interesting is the ability to predict the properties of the composition out of the properties of its constituent services.

2 Project Rationale and Exploitation Plan

2.1 Rationale

The presence of numerous basic services over the Internet is creating a new business opportunity for providing value added, inter-organisational services by composing multiple basic services into composite services. ADAPT will develop the technology, software infrastructure and a working system capable of defining, enacting, and monitoring inter-organisational business processes and supporting related coordination activities. The results of ADAPT will be open source and of interest to wide scientific and industrial communities, and will include: 1) Tools for creation of self-descriptive basic services built over commonly-used middleware; 2) a middleware platform for composite service creation and management, allowing enterprises to publish the services they provide, use services available globally in a secure manner as components of a composite service, specify its structure in a visual programming language, automatically compile the description into an executable process, and deploy and monitor the execution of such composite processes. The composite service middleware platform will contain re-configuration and self-repairing features to enable a composite service to adapt itself to changes caused by insertion or withdrawal of services, changes in network conditions and changes in user requirements. The project will develop demonstrator applications; the main demonstrator being a long running one (such as a travel planning e-service) through which the project will demonstrate composition, monitoring, management and dynamic adaptability to various changes both in the execution environment and in the system configuration.

2.2 Exploitation Plan

The exploitation of open-source software is usually carried out by one or more organizations that assume the maintenance of the product and provide support to its users. There are a number of companies that are devoted to provide consultancies on open-source software such as, Andago, Alcove, I+D Agora. We plan to publicize ADAPT results among them to foster their use. The clients of these companies are clients looking for open-source solutions and therefore they are very adequate for exploiting ADAPT results. Apart from communicating them the advances taken in ADAPT, we plan to invite them to the open workshops organized by our consortium to guarantee an appropriate dissemination and foster the exploitation of ADAPT results by these organizations. In the Free/Open Source Software Projects Concertation Meeting organized by the Commission, we met a number of companies interested in exploiting ADAPT results. Just to name a few: IDEALX, Conecta, Jaluna, Minoru. These contacts will be very helpful for exploitation purposes.

A second group of organizations that can be interested in exploiting ADAPT results are those that maintain the software products that will be enhanced by ADAPT, such as PostgreSQL and JBoss. We

think that an effective technology transfer is feasible in which the technology developed by ADAPT will influence future versions of their software. We will exploit the close contacts that the different partners keep with these organizations (McGill with PostgreSQL, Arjuna with JBoss).

A third group of organizations that can be interested in exploiting ADAPT results are non-for-profit organizations that promote and support open-source/free software, such as ObjectWeb. These organizations can host some of the ADAPT contributions as projects.

Universidad Politécnica de Madrid.

UPM has contacted ObjectWeb representatives at the ObjectWeb conference held in Paris November 2003 to explore the possible open-source exploitation of its contributions as ObjectWeb hosted projects. Initial interest has been shown in three contributions from UPM: Middle-R, a middleware for database replication, the J2EE Activity Service based transaction engine for advanced transaction models, and the WS-CAF support for supporting transactional web services.

Prof. Ricardo Jiménez-Peris and Marta Patiño-Martínez joined ObjectWeb as individual members. After the first informal meeting, a presentation was made at the ObjectWeb Architects meeting in Seville in January 2004 that resulted in the acceptance of JASS (J2EE Advanced tranSaction Support) as ObjectWeb hosted project. This project includes the J2EE Activity Service and web service interoperability support.

In February 2004, UPM team attended the ObjectWeb JOnAS Developers Workshop at Grenoble (23-24th February 2004) and presented the projects JASS and Middle-R. Discussions were held with the development teams of JOTM, GOTM, JOnAS, and Bonita to enable the integration of JASS with these ObjectWeb projects.

UPM is still deciding the best open-source exploitation path for Middle-R. UPM is currently considering the possibility to exploit Middle-R as an ObjectWeb project and its integration with C-JDBC (a complementary ObjectWeb project).

UPM has also established contacts with MySQL to integrate in the production version two services required by Middle-R. Contact with MySQL co-founder, David Axmark, has been successful and MySQL has expressed its interest in including the services in the production version. Contacts are kept with Brian Aker, Director of MySQL Architecture.

Contact has also been established with PostgreSQL through Prof. Bettina Kemme (McGill) to include these services in the production version of PostgreSQL.

UPM signed a contract Sept. 2003 with Microsoft Research Cambridge to extend ADAPT results to Microsoft technology (in an open-source fashion). More concretely, Microsoft is interested in extending Middle-R to support SQLServer.

Università di Bologna.

The main software contribution in which Bologna is involved, a component replication framework, will be distributed as a SourceForge project, under the Lesser GNU Public License (LGPL).

ETH Zurich.

JOpera is the main result contributed by ETH to the project. Right now, most of JOpera was prior art developed as part of other projects. After the decision to adopt JOpera as the main composition engine of the ADAPT project, work has started to make JOpera as open system. JOpera is already available in binary form and can be downloaded under a Berkeley license. For the eventual release of the source code, the actual form of the license will depend on the nature of support and the degree of integration of standards like BPEL. We continue the efforts to clarify these issues.

McGill University.

McGill University heavily participates in the replication efforts within the PostgreSQL community. The Postgres-R replication effort hosted at Gborg (PostgreSQL related projects) has their current contributions mainly coming from McGill University. The efforts on Postgres-R are partly integrated into the ADAPT project. Licensing is under the Berkeley/BSD license according to PostgreSQL policy.

The replication strategies that are currently implemented at McGill use the component replication framework developed at the University of Bologna, and hence, will follow the same licensing policy, namely the Lesser GNU Public License (LGPL).

University of Trieste.

Trieste will distribute its software as a SourceForge project, under the Lesser GNU Public License (LGPL). The main contribution from Trieste, JBora, runs on top of Spread. Spread is distributed and licensed by Spread Concepts LLS (<http://www.spread.org>)

Newcastle University.

Newcastle is taking part in a UK funded demonstrator project on virtual organisations for chemical industries. Use of technologies developed within ADAPT will be an essential aspect of the project. In particular, service composition and orchestration techniques currently being developed within ADAPT will be highly relevant.

Arjuna Technologies Ltd.

Within ADAPT, Arjuna has written proof of concept software used by project partners that we intend to make open source. We have constructed a specification for the ADAPT demonstrator using royalty free specifications and examples and we intend to make the demonstrator software open source. We have licensed an implementation of Arjuna TS (to the ADAPT project) as a fully functional transactional service while open source alternatives mature. We are continuing to have an active partnership with JBoss group and we continue to feedback improvements to their open source offering. We continue to interact with JacORB to improve their open source offering. However, Arjunas main task now is to push forward with the development of the Web Services Composite Application Framework (WS-CAF) specification to provide a single standard for transaction coordination and a non-proprietary royalty free standard for the industry. In this regard, during the past six months, Arjuna has:

- released the first public version of WS-CAF with Sun, Oracle, IONA and Fujitsu, in August 03.
- worked with our collaborators to initiate an OASIS technical committee on WS-CAF and submitted our specifications. The specifications will produce open standards in the area of Web services context, coordination and transactions and will be royalty free. This is in marked contrast to the work by IBM/Microsoft/BEA on WS-C/T. At present only WS-CAF has a context specification.
- Since the formation of the OASIS TC, we have had many teleconferences and one face-to-face meeting in Boston (December 03), with all of the TC members. Arjuna has worked on the formation of the TC which now includes HP, Attachmate, Booz Allen Hamilton, Iopsis, WebMethods, Systinet, SeeBeyond, Cyclone Commerce and Choreology. We are working through the WS-Context issues to achieve a stable and implementable specification.
- Arjuna has also worked within the TC on the formation of an interoperability demonstration sub-committee. This group will define a basic example that will allow different vendors' implementations of WS-Context to interoperate. We've taken the WS-I example and shown where WS-Context can fit into that. This is on going work and the example will evolve as we move on to WS-CF and WS-TXM.

- Arjuna has pushed the ideas behind WS-CAF in a number of public venues, such as XML 2003 and the High Performance Transactions Systems workshop 2003.
- Arjuna is also continuing to talk to IBM, Microsoft and BEA about closer collaboration between them and the WS-CAF technical committee:
<http://www-106.ibm.com/developerworks/webservices/library/ws-comproto/>.
- Arjuna is working with the Grid community to show how they can leverage WS-CAF:
http://gcn.com/vol1_no1/daily-updates/24939-1.html
and <http://www.arjuna.com/library/reports/2003-08-12-GAF-v1.0.pdf>.

3 Project Objectives

The main goal of ADAPT is to develop the technology and software infrastructure necessary for defining, enacting, and monitoring inter-enterprise business processes that are implemented as composite services with guarantees of availability, scalability and adaptability not only to changing network conditions and user requirements but also to reconfigurations and repairs. ADAPT will also provide middleware support for available and dynamically adaptive basic services that will be used to build higher level composite services.

4 Achievements and Project Status

The first six months of the second year have been mainly devoted to software development of month 18 and 24 deliverables.

Universidad Politécnica de Madrid.

The Distributed Systems Lab (LSD) has concentrated its effort on two contributions: Middle-R: middleware for database replication and JASS Java Advanced transaction Support.

Development in Middle-R is centered on:

- The middleware itself is being evolved from a very constrained research prototype to an open-source product.
- A JDBC driver for Middle-R is being developed to enable interoperability with J2EE.
- Adaptability support is being developed (such as load balancing).
- Online recovery is being implemented to enable recovery without disrupting regular processing.

The effort in JASS is concentrated on:

- Support for advanced transactions in J2EE. This support is being performed following the recent J2EE Activity Service specification. This includes the implementation of the Activity Service and the implementation of a High Level Service supporting open nested transactions (as suggested in the review, we have moved from a generic transactional engine to the support of a particular advanced transaction model). An implementation of the basic functionality has been completed and will be the basis of deliverable D4 Transactional Engine.
- Support for web service interoperability with transactional services. This support will adopt one of the specifications currently being developed such as the recent Oasis WS Coordination Activity Framework (WS-CAF) and WS-C/WS-T from IBM and Microsoft.

Università di Bologna.

In Brussels, at the 12-month review meeting, we presented a proposal for a replication framework, which would allow different replication algorithms to be plugged in to a J2EE server. Since then, we have completed the design and coding of a first version of this framework. Currently, replication algorithms are being developed within the framework, at both Trieste and McGill. Together, the framework and the replication algorithms will constitute ADAPT deliverable D3 Replication Tool.

ETH Zurich.

ETH Zurich has been working on the composition engine for Web services (JOpera). The work has been focused on improving the front end (visual language, expressiveness), making the code more robust, and starting to consider development possibilities for supporting messaging as part of the execution engine. Messaging will be an important feature to support recently proposed standards for Web service composition such as BPEL and BPML. Some highlights of the activity in this period include:

- In the plenary meeting of December, 2003, it was decided that JOpera will be the main composition engine within the project
- JOpera has been made publicly available on the web in binary form (Berkeley license). There have been nearly 300 downloads so far and we already have a few users who are using the system in semi-production settings (for grid computing).
- Work on messaging support has commenced based on initial performance and functionality analysis of existing tools
- Work on porting the interface and tools of JOpera to Java has started (the main engine runs in Java but many of the tools and the GUI were developed in a different context and now need to be aligned with the goals of ADAPT)
- Analysis of BPEL and BPML continues to study ways to support these standard specifications while avoiding licensing issues. The current approach is to provide a language more general and powerful than BPEL so that BPEL is seen as a subset of the JOpera language.
- The publication effort around JOpera has now started to increase. A paper was presented in October (see publications), there are two journal and one conference submissions pending acceptance.
- Several tutorials and courses where ADAPT will be presented have been submitted or are being planned for the coming months

McGill University.

The distributed information systems lab of McGill university has worked on the following components:

- EJB Replication. Based on the Replication framework provided by the University of Bologna, McGill is currently implementing a replication strategy for EJB providing failover in case of system crashes. The replication strategy takes into account the transactional semantics of web-services.
- Middle-R. Middle-R requires special functionality from the underlying database system to get the writeset of a transaction and apply it at remote sites. The original Middle-R worked with an enhanced version of PostgreSQL v6. Since then, PostgreSQL has released version 7. McGill has included the get/put write semantics into PostgreSQL 7. We are attempting to make this extension a standard part of the PostgreSQL delivery.

- Postgres-R. We are currently integrating an adaptive, update-everywhere, eager replication strategy into the PostgreSQL kernel. The first phase is nearly completed (normal processing and failover), and a first prototype will be released this summer. The next phase will start this summer and implement online-recovery.

University of Trieste.

Treiste has concentrated its effort on the group communication tool called JBora. JBora is illustrated in detail in the deliverable D2 Reliable Communication.

- A stable release of JBora2 has been distributed to all partners.
- Further optimization of JBora, based on adaptive message packing as described in deliverable D2, has been done and is still in progress.
- A set of utility classes that help organizing information necessary to replication algorithms has been distributed to all partners.
- Several replication algorithms have been designed and partly implemented for internal purposes. An algorithm for replication of Axis-based web services based on the replication framework provided by Bologna (deliverable D3) is currently under development.

Newcastle University.

Newcastle has continued to work on the service specification and composition techniques reported in deliverables D6 and D7. In particular, we have developed techniques for verifying the correctness of service compositions using pi-calculus. This work will be reported in the 2nd year deliverable on analysis tools. Newcastle has also been working on the development of trusted coordination mechanisms, in collaboration with TAPAS project. The results from this work will form part of 2nd year deliverable report D12 on security. The main work has been on the development of non-repudiated service interaction mechanisms and their incorporation in component middleware, such as JBoss.

Arjuna Technologies Ltd.

Arjuna has concentrated on the Demonstrator Specification (D17) and the updated Evaluation Plan which has been reshaped to take account of the reviewers comments.. In fact, one of the aims of the ADAPT project - supporting the construction of composition of services has provided an interesting challenge when specifying the ADAPT demonstrator. This is because, basing the demonstrator on a single uniform design would not show composition - as a single design would have been designed to be "composable". Hence the ADAPT demonstrator will be based on two different designs for a Supply Chain Management system: WS-Is (Web Services Interoperability) Sample Application Specification and the RosettaNets Order Management (Cluster 3) Standards. We will also be monitoring the XML Common Business Library (xCBL) to see if that standard can play a part in the ADAPT demonstrator. WS-Is Sample Application Specification and RosettaNets Order Management Standards are sufficiently different in their design that composition is challenging, but possible for some interactions. Also, the relevant service that makes up the systems can be implemented as an ADAPT Basic Service. So, combining WS-I and RosettaNet looks a good approach for specifying a demonstrator for the ADAPT project. In addition, Arjuna has continued to work closely with Newcastle University to progress work on composite service specification and analysis

5 Adherence to Workplan

5.1 Resource Usage

- UPM. 22 person-month for technical work, plus 3 person-month for coordination (scheduled 17 person-month). There is an increase in the workforce to compensate for the delays in the contracts of the first year.
- UniBo. 17 person-months of additional personnel effort (scheduled effort 12 person-months).
- ETHZ. 9 person/month (as scheduled).
- McGill. Hired staff: 6 months by a PhD student, 2.8 months by a technician Permanent staff: 0.6 months
- Trieste. 6 person-months of additional personnel. 2 person-months of permanent staff.
- UNEW. 9 person-months of additional effort plus 18 person-months of permanent staff effort.
- Arjuna. 6 person/month (as scheduled).

5.2 Deliverable Schedule Update

- The deliverables: revised D16 Updated Evaluation Plan (delivered in month 12, and asked for revised versions by months 18 and 24), D17 Demonstration Plan, have been delayed for three weeks (till 21st March 2004).
- The deliverable Analysis Tools has been delayed to month 24.

5.3 Modifications to Workplan

There are no modifications to the workplan except for the delay of deliverable Analysis Tools. Since, there are no dependencies from other deliverables on this one, the rest of the workplan remain as planned.

6 Cooperation in the Project

6.1 Fourth Adapt Plenary Workshop. Bologna, 11-12 December 2003.

The workshop was organized around the deliverables of month 18 and 24. Presentations on the different deliverables were made by the corresponding leaders followed by a discussion session:

- For the deliverable D8 Analysis tools, it was decided a change of leadership from Zurich to Newcastle and that the contributions from Newcastle would form the core of this deliverable. It was also decided to ask for 6-month postponement to enable the readjustment.
- Regarding the revised version of DUP solicited by reviewers, Madrid made a presentation on the ten most representative open source licenses and the implications of each one.
- A presentation by Trieste was made on deliverable D2 Reliable Communication showing what would constitute the bulk of this deliverable.
- Madrid made a presentation proposing as contents for deliverable D4 Transactional Engine an implementation of the recent J2EE Activity Service specification. It was agreed that it was an adequate election for supporting advanced transactions in J2EE applications.
- A discussion session was devoted to reshape deliverable D16 Updated Evaluation Plan. It was decided that each partner should propose quantitative evaluations of each of the software deliverables being produced.

- For the deliverable D3 Replication Tool a presentation was made by Bologna on the architecture for replication of EJBs. Discussions followed on the open issues related to the integration of EJB replication and database replication.
- A presentation was made by Zurich on the proposed contributions for D10 CS Availability Container and D11 Adaptability Container based on their new Java workflow engine. The consortium agreed on the appropriateness of the contributions for both deliverables. It was decided to change the leadership of D11 from Bologna to Zurich. It was also decided that their workflow would be the core component of deliverable D14 CS Middleware.
- Arjuna made a presentation on the possibilities for the demonstration application. A discussion followed on the most appropriate kind of application to show the different aspects of the basic and composite services. The deliverable D17 Demonstrator Specification will summarize the demonstration application.
- Newcastle made a presentation on deliverable D12 Security report.

Talks and schedule available at: <http://adapt.ls.fi.upm.es/bologna-dec-2003-meeting.htm>

6.2 Other Cooperation

- Review Meeting, Brussels, 17th October, 2003.
- Bilateral Meetings between Newcastle and Arjuna.
- Cooperation between Madrid and Montreal on database replication. Several phone meetings.
- Cooperation between Bologna, Trieste, and Montreal on application server replication. Several phone meetings.
- Cooperation between Madrid and Arjuna regarding J2EE Activity Service and OASIS WS-CAF.
- Cooperation between Newcastle and Zurich on analysis tools.

7 Coordination with other Projects/Programmes

Universidad Politécnica de Madrid

- Prof. Ricardo Jiménez-Peris, Prof. Marta Patiño-Martínez, and Mr. Francisco Pérez-Sorrosal attended the ITEA OSMOSE Workshop (Sevilla, 14-15th January 2004) to explore synergies between the projects. Integration of JASS with JOnAS and JOTM will be the result of the cooperation between OSMOSE and ADAPT.
- Cooperation with TAPAS has been established (via Newcastle coordinator of TAPAS) in the scope of deliverable D12 Security report to exploit results from TAPAS.
- UPM participated as core member (as coordinator of Adapt) in the Coordination Action proposal on Service Engineering (UNISERVE) that stemmed from the cluster of projects on the same topic set up by the Commission. The proposal was submitted to the second call of FP6.
- Microsoft Research is funding the extension of Middle-R to support SQLServer under grant MS-2003-193. These results will be open-source with the same licensing as Middle-R.

ETH Zurich

- ETH Zurich has held contacts recently with MS Research (US) regarding the development of support for Web service composition.

Arjuna Technologies Ltd.

- Dr. Stuart Wheater and Dr Mark Little participated as Advisory Board members on TAPAS and attended numerous meetings with the TAPAS team at Newcastle University.
- Dr. Stuart Wheater and Dr Mark Little Attended TAPAS meeting (2nd February 2004).
- Dr Mark Little and Dr Malik Saheb attended WS-CAF meeting in Boston, US (02-05th December 2003).
- Dr Mark Little attended WS-Choreography meeting in Cambridge, UK (18th December 2003).
- Participation in the EUCOSM project proposal, where WS-CAF amongst other open standards was to be used.
- Participation in the CELTIC project ADPO, where WS-CAF was to be used as a standard. ADPO has been awarded the CELTIC label and will go forward. Unfortunately, however, the UK is unable to fund participation in CELTIC at this moment in time and Arjuna has had to withdraw.

8 Promotion/Information Dissemination

8.1 Standardization Bodies

The following standardization bodies have been identified as the most relevant for ADAPT:

- World Wide Web Consortium (W3C): “The World Wide Web Consortium (W3C) develops interoperable technologies (specifications, guidelines, software, and tools) to lead the Web to its full potential. ”
- OASIS: “OASIS is a not-for-profit, global consortium that drives the development, convergence and adoption of e-business standards.”
- Java Community Process (JCP): “Java Community Process (JCP) is the way the Java platform evolves. It is an open organization of international Java developers and licensees whose charter is to develop and revise Java technology specifications, reference implementations, and technology compatibility kits.”

Arjuna Technologies Ltd.

- Arjuna has joined OASIS, JCP, and W3C.
- Arjuna is leading the WS-CAF specification at Oasis.
- Arjuna is leading the J2EE Activity Service specification at JCP.

Universidad Politécnica de Madrid

- UPM has joined Oasis and become a member of the Technical Committees of WS-CAF and BPEL4WS.
- UPM has joined JCP in order to participate in the J2EE Activity Service specification.

8.2 Publications

- R. Jiménez-Peris, M. Patiño-Martínez, G. Alonso, and B. Kemme. Are Quorums an Alternative for Data Replication? *ACM Transactions on Database Systems*, Vol. 28, N. 3, Sept. 2003, pp. 257-294, ACM Press.
- A. Bartoli. Implementing a replicated service with group communication. *Journal of Systems Architecture*. Elsevier. To appear.
- Mark Little, Jim Webber. Introducing WS-CAF - More than just transactions, *Web Services Journal* (<http://www.sys-con.com/webservices/articleprint.cfm?id=737>).
- V. Maverick. *Object Model for Pluggable J2EE Replication Strategies*. Università di Bologna, Technical Report. Feb. 2004.
- C. Pautasso, G. Alonso: Visual Composition of Web Services Proc. of the 2003 IEEE Symposia on Human Centric Computing Languages and Environments (HCC 2003), Auckland, New Zealand, October 2003.
- C. Pautasso, G. Alonso. JOpera: a Toolkit for Efficient Visual Composition of Web Services. Technical report no. 432, January 2004. Department of Computer Science. ETH Zürich.
- N. Cook, P. Robinson and S. K. Shrivastava, "Component Middleware to Support Non-Repudiable Service Interactions" Technical Report, Newcastle University. Submitted for publication.

8.3 Dissemination activities

Universidad Politécnica de Madrid

- One of the contributions of the project, the database replication middleware was presented in an invited talk at Universidad Pública de Navarra, (Pamplona, 28th November 2003) by Prof. Marta Patiño-Martínez.
- The project was presented in an invited talk at Universidad Pública de Navarra (Pamplona, 28th November 2003) by Prof. Ricardo Jiménez-Peris.
- Prof. Ricardo Jiménez-Peris attended the ObjectWeb Conference (Paris, 20-21 November 2003) to establish contacts with ObjectWeb representatives to explore the open-source dissemination of Madrid contributions through ObjectWeb. Meetings were held with representatives of the following projects: JOTM (transactional engine), GOTM (new transactional engine), Bonita (workflow system), JaWee (workflow visual editor), and JOnAS (EJB-based application server).
- Professors Ricardo Jiménez-Peris and Marta Patiño-Martínez joined ObjectWeb as individual members.
- Presentation of the results of ADAPT regarding dynamically adaptive database replication at the Network of Excellence Cabernet Workshop. Porto Santo, Madeira (Portugal). Nov. 2003. J. M. Milán-Franco, R. Jiménez-Peris, M. Patiño-Martínez. Towards Dynamically Adaptive Replicated Databases.
- Presentation of *JASS: J2EE Advanced transaction Support* at ObjectWeb Architects Meeting (Sevilla. 13th January 2004) by Prof. Ricardo Jiménez-Peris.
- Presentation of JASS architecture at ObjectWeb JOnAS Developers workshop (Grenoble, 23-24 February 2004).

- Presentation of Middle-R status at ObjectWeb JOnAS Developers workshop (Grenoble, 23-24 February 2004).
- UPM has been awarded with a grant from Microsoft Research Cambridge in a competitive call (RFP, request for proposals) closed January 2004 for creating curricular materials on distributed systems that will cover technology from ADAPT.
- Prof. Ricardo Jiménez-Peris and Prof. Marta Patiño-Martínez has participated in the CaberNet vision document (<http://www.newcastle.research.ec.org/cabernet/>) in the context of the Cabernet Network of Excellence on Dependable Distributed Systems in a chapter on group communication. In this chapter, the work on Middle-R from UPM and McGill and the work on Postgres-R from McGill are referenced. The ADAPT project is listed in the list of Cabernet related projects.

ETH Zurich

- Talk to representatives of the Hasler foundation by Prof. G. Alonso and C. Pautasso. The talk covered JOpera and the work around the ADAPT project.
- Industry course titled "Web Services: Concepts, Architectures and Applications" at ETH Zurich (9th and 10th of February, 2004). By Prof. G. Alonso, C. Pautasso, D. Joensson. The project was discussed and JOpera demonstrated to an audience of industry representatives.
- Talk on Web services at Uni. Stuttgart by Prof. G. Alonso. The ADAPT project was presented and a brief demo of JOpera given. 11th February, 2004.
- Talk on *Visual Composition in Web services* by C. Pautasso presenting JOpera at the 2003 IEEE Symposia on Human Centric Computing Languages and Environments (HCC 2003), Auckland, New Zealand, October 2003.

Arjuna Technologies Ltd.

- Presentation of WS-CAF at XML 2003, Philadelphia (December 2003): <http://www.arjuna.com/library/technical/2003-XML2003-WebServicesTransactions-paper.pdf>
- Presentation of WS-CAF at the High Performance Transactions Systems workshop, Asilomar (October 2003): <http://research.sun.com/hpts2003/>.

University of Newcastle

- Newcastle members participated in the first International conference on service oriented computing, Trento, Dec 03. The workflow management system, DECS (described in the deliverable report D7) was presented at a poster session.

University of Trieste

- Prof. Alberto Bartoli has presented the ADAPT project in a lecture given at the inauguration of the academic year of the University of Trieste, in presence of the Italian Minister of Innovation and Technologies, Mr. Lucio Stanca.

9 Conclusion

The project is progressing according schedule. Some deliverables have been reshaped to accommodate them to changes in scientific and standards arena.

10 Appendices

10.1 Updated Consortiums Relevant Persons Working and/or Associated to the Project

- UPM.

Permanent staff: Prof. R. Jiménez-Peris, Prof. M. Patiño-Martínez.

Hired staff: Mr. Francisco Perez, Mr. Alberto Martínez, Mr. Damián Serrano, and Mr. David Jimenez.

Mr. Jesús Milán, is collaborating in the project although currently without a contractual link.

- UniBo.

Permanent staff: Prof. Ozalp Babaoglu, Dr. Alberto Montresor.

Hired staff: Dr. Vance Maverick, Dr. Simon Patarin, Dr. Jaks Vuckovic.

- ETHZ.

Permanent staff: Prof. Gustavo Alonso.

Hired staff: Mr. Daniel Joensson, Mr. Bioern Bioernstad, Mr. Cesare Pautasso

- McGill.

Permanent staff: Prof. Bettina Kemme.

Hired staff: Mr. Huaigu Wu (PhD), Mr. Shuqing Wu (technician 1), and Mr. Yi Lin (technicians 2).

- Trieste.

Permanent staff: Prof. Alberto Bartoli.

Hired staff: Mr. Milan Prica.

Mr. Etienne Antoniutti di Muro is working on the project without a contractual link, as a PhD student.

- UNEW.

Permanent staff: Prof. Santosh Shrivastava, Dr. Graham Morgan.

Hired Staff: Mr. Simon Woodman.

- Arjuna.

Staff: Dr. Stuart Wheeler, Dave Ingham, Dr. Mark Little, Dr Malik Saheb.